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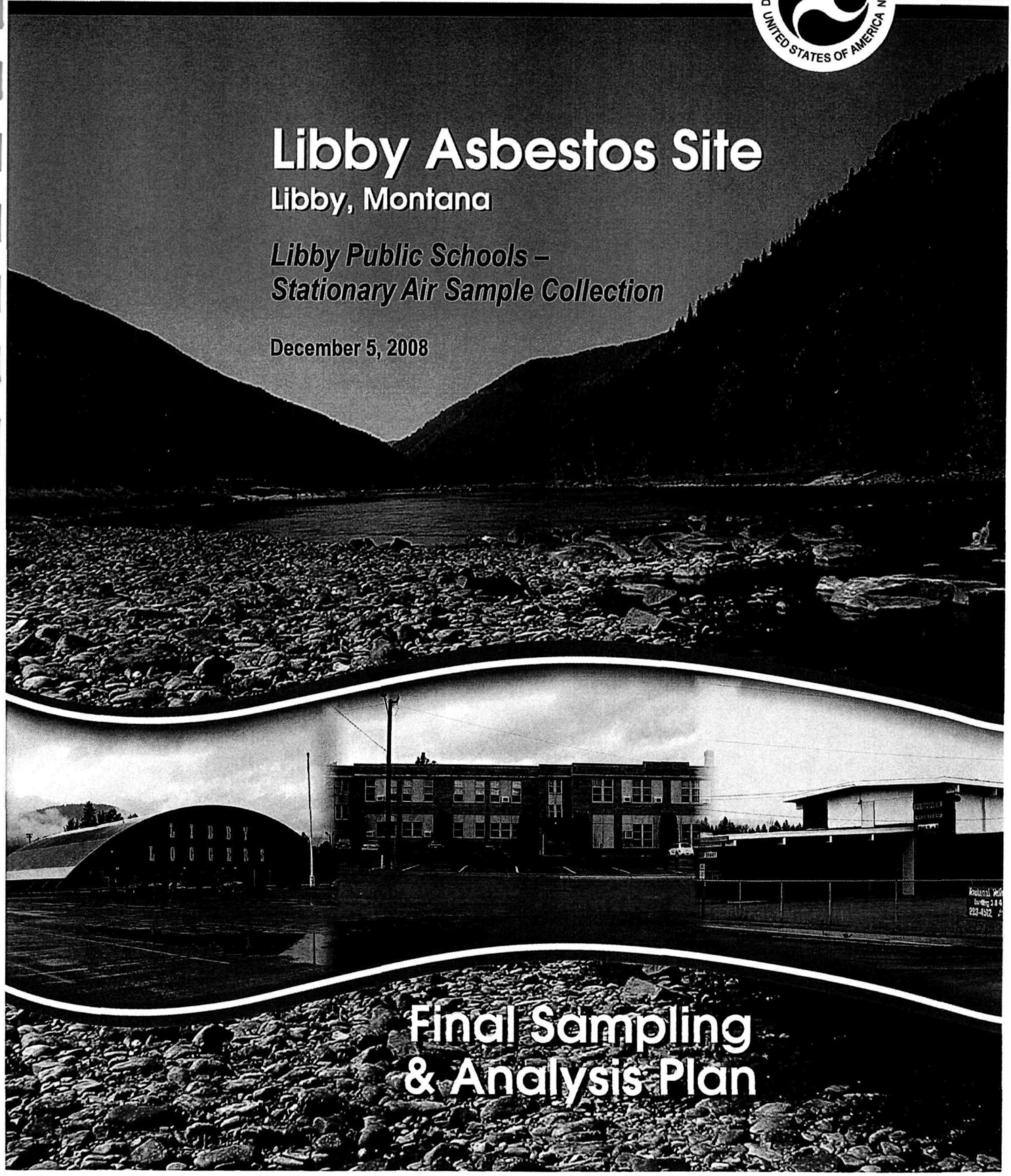
DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

Libby Asbestos Site

Libby, Montana

Libby Public Schools – Stationary Air Sample Collection

December 5, 2008



Final Sampling & Analysis Plan

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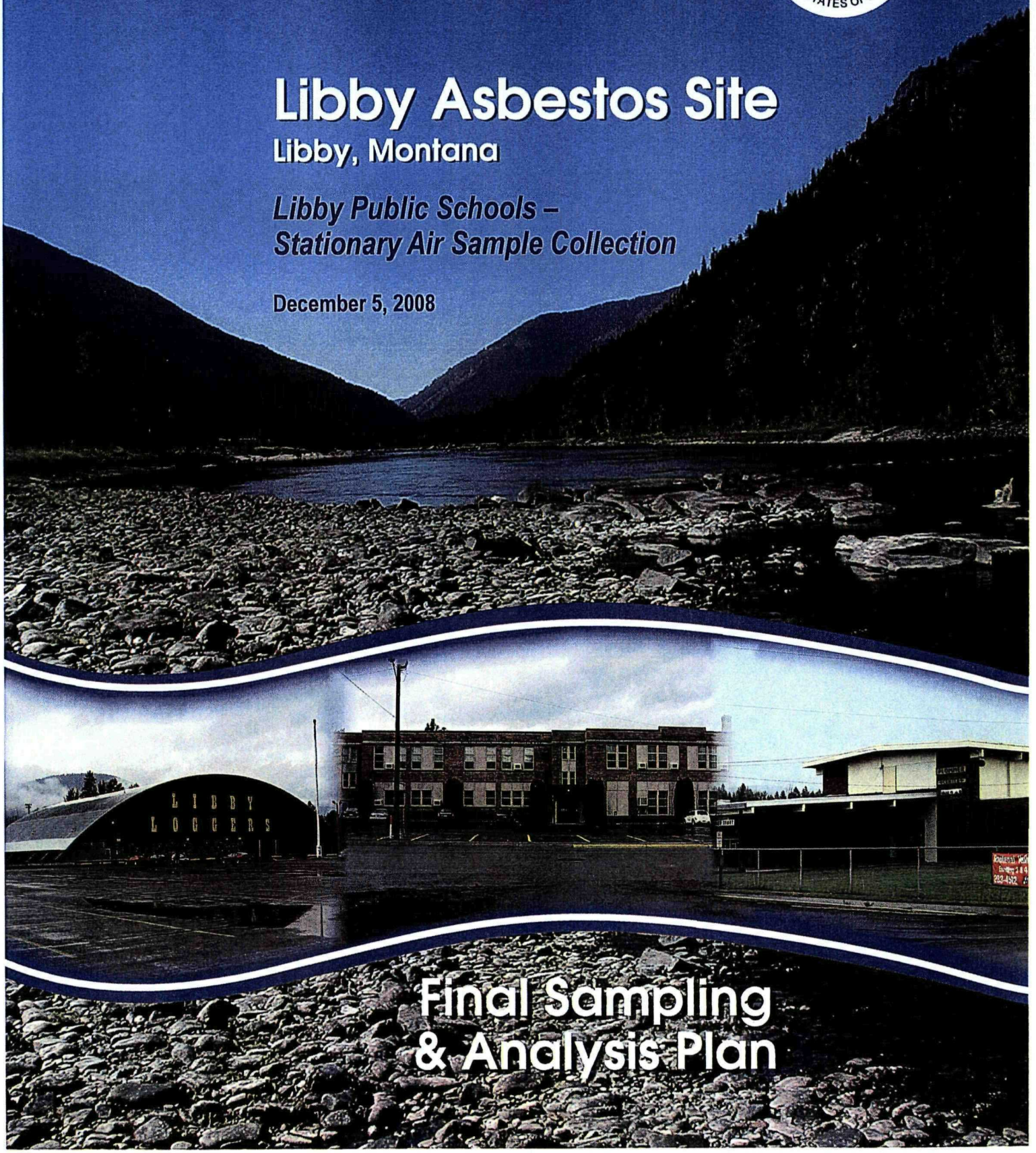

Final Sampling & Analysis Plan

Final
Sampling and Analysis Plan
Libby Public Schools - Stationary Air Sample Collection
Libby Asbestos Site
Libby, Montana

December 5, 2008

Contract No. DTRT57-05-D-30109
Task Order No. 00015

U.S. Environmental Protection Agency
Region 8
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Final
Sampling and Analysis Plan
Libby Public Schools- Stationary Air Sample Collection
Libby Asbestos Site
Libby, Montana

December 5, 2008

Contract No. DTRT57-05-D-30109
Task Order No. 00015

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Contents

Figures

Tables

Acronyms

ACM	Asbestos-containing material
AHERA	Asbestos Hazard Emergency Response Act
C	concentration
CDM	CDM Federal Programs Corporation
CFR	Code of Federal Regulations
COC	chain of custody
DQOs	data quality objectives
eCOC	electronic chain of custody
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
f/cc	Fibers per Cubic Centimeter
FSDS	Field sample data sheet
FTL	Field team leader
GPS	global positioning system
GSD	geometric standard deviation
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IDW	investigation-derived waste
IFM	Investigation Field Manager
ISO	International Organization for Standardization
L	liters
LA	Libby amphibole asbestos
MCE	mixed cellulose ester
mm	millimeter
PCM	phase contrast microscopy
PES	Pacific Environmental Services
PLN	Poisson lognormal
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RBF	Risk-Based Fraction
s/cc	structures per cubic centimeter
s/cm^2	structures per square centimeter
SAP	sampling and analysis plan
Site	Libby Superfund site
SOP	standard operating procedure
SQAPP	Supplemental Quality Assurance Project Plan
SRC	Syracuse Research Corporation
TEM	transmission electron microscopy
TWF	Time-Weighting Factor
UCL	Upper Confidence Limit
µm	micrometer

UR	Unit Risk
VCBM	Vermiculite-containing building material
Volpe Center	John A. Volpe National Transportation Systems Center

Section 1
Introduction

This sampling and analysis plan (SAP) describes the collection and analysis of stationary air samples to support the assessment of Libby amphibole asbestos (LA) concentrations in air at the public schools in Libby, Montana. This document focuses on the collection of data needed to characterize exposures inside of the schools. A sampling plan to investigate potential exposures at outdoor locations on school grounds will be provided in a separate document.

This SAP contains all the elements required for both a field sampling plan and quality assurance project plan, and has been developed in accordance with the *Environmental Protection Agency* (EPA) *Requirements for Quality Assurance* (QA) *Project Plans, EPA QA/R-5* (EPA 2001), and the *Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G4* (EPA 2006).

The purpose of this SAP is to describe the sampling objectives, locations, measurement methods, and data quality objectives (DQOs) for the stationary air school sampling program. The SAP is organized as follows:

Section 1 – Introduction
Section 2 – Site Background
Section 3 – DQOs
Section 4 – Sampling Program
Section 5 – Laboratory Analysis and Requirements
Section 6 – References
Appendices

As evaluations of data specific to the public schools are completed, additional sampling efforts may be required. If additional sampling efforts are required, SAPs specific to those efforts will be generated prior to sample collection.

The investigation will include the following public schools in Libby:

- Kootenai Valley Head Start – 247 Indian Head Rd
- Asa Wood Elementary School – 700 Idaho Ave
- Libby Middle School – 101 Ski Rd
- Libby High School – 150 Education Way
- Libby Administration Building – 724 Louisiana Ave

1.1 Objectives

This section defines the objectives of the sampling program and the intended use of data.

As determined by previous investigations conducted at the Libby Superfund Site (Site), LA is present in multiple environmental media in Libby including: indoor air,

outdoor ambient air, indoor dust, vermiculite insulation, and soils. As a result, residents of Libby may be exposed to LA, and these exposures may pose a risk of cancer and/or non-cancer effects. The objective of this sampling program is to collect data of sufficient representativeness and quality to evaluate any potential exposures and risk from LA in indoor air at Libby schools under present site conditions.

1.2 Project Schedule and Deliverables

Sampling is expected to be conducted over two sequential days at each of the five school buildings. Each school will be sampled as described in Section 4 in December 2008. Once the initial data set is evaluated by EPA risk assessment and management teams, additional data collection may be deemed necessary to support final decision-making for the Libby public schools.

Section 2
Site Background

This section describes site location, history, and information regarding the Site.

2.1 Site Location

Libby is a community in northwestern Montana located near an open pit vermiculite mine that operated from the 1920s until 1990. The mine began limited operations in the 1920s and was operated on a larger scale by the W. R. Grace Company from approximately 1963 to 1990. Studies at the Site reveal that the vermiculite from the mine contains amphibole-type asbestos, referred to in this report as LA. Epidemiological studies at the Site revealed that workers at the mine had an increased risk of developing asbestos-related lung disease (McDonald et al. 1986, Amandus and Wheeler 1987, Amandus et al. 1987a, b, Sullivan 2007, Rohs et al. 2007). In 2003, Peipins et al. demonstrated radiographic abnormalities in 17.8 percent of the general population of Libby including former workers, family members of workers, and individuals with no specific pathway of exposure. Although the mine has ceased operations, historic or continuing releases of LA from mine-related materials could be serving as a source of ongoing exposure and risk to current and future residents and workers in the area. Since 1999, EPA has conducted sampling and cleanup activities at the Site related to asbestos-related health problems in the Libby population. The Site was listed on the Superfund National Priority List in February 2002.

Currently there are five public schools in Libby (Kootenai Valley Head Start [formerly Plummer Elementary School], Asa Wood Elementary School, Libby Middle School [formerly Libby Junior High School], Libby High School, and Libby Administration Building) and their locations are depicted in Figure 2-1. The former McGrade Elementary School is no longer utilized by the public school system. Due to the similarity of its construction with the Kootenai Valley Head Start building, the former McGrade Elementary School may be re-inspected and sampled in the future contingent on the findings of this investigation.

2.2 Historic School Inspections and Sampling

Numerous investigations and/or removal actions have occurred at each of the five Libby public schools that will be sampled during this investigation. Results of previous indoor investigations and removal actions conducted at each of the five schools are discussed in this section. A summary of all indoor investigation and inspection work performed at each school is summarized in Sections 2.2.1 through 2.2.5.

In January 2000, each of the five schools that will be part of the sampling described in this SAP were inspected in accordance with EPA's Asbestos Hazard Emergency Response Act (AHERA) to determine if any of the asbestos-containing materials (ACM) identified within these schools contained LA. Additionally, historic AHERA inspection reports were reviewed to aid in summarizing the presence, location,

quantity, percent asbestos, and condition of ACM. Although no bulk samples were collected to confirm the presence of LA in any building materials, the visual inspections performed by Pacific Environmental Services (PES) did not identify any materials believed to contain LA. A detailed summary of the January 2000 school inspections, including tables and descriptions of ACM are available in *Review of Asbestos Surveys and Visual Inspection Libby Public Schools* (PES 2000), is provided in Appendix A.

Concurrent with the inspection for ACM, indoor stationary air samples and dust samples were collected from each of the schools in January 2000. These efforts were conducted in accordance with the *Environmental Monitoring of Asbestos Sampling and Quality Assurance Project Plan* (EPA 2000). Additional dust samples were collected in 2003 from the Libby Administration Building in accordance with the *Final Draft Pre-Design Inspection Activities Work Plan* (CDM Federal Programs Corporation [CDM 2003]). All samples were analyzed using transmission electron microscopy (TEM) in accord with the International Organization for Standardization (ISO) 10312 method (ISO 1995) counting protocols and the analytical sample results are summarized for each school in Sections 2.2.1 through 2.2.5 and presented in Table 2-1. Since the initial investigations performed in January 2000, removal actions have occurred at some of these schools. The exterior portions of these removals are briefly summarized below and the interior removals are summarized by school in Sections 2.2.1 through 2.2.5.

- Kootenai Valley Head Start (formerly Plummer Elementary) - the former ice rink was removed in 2001 and additional exterior removal was completed in 2002 when vermiculite was observed in the former pond area, adjacent to the former ice rink.

- Asa Wood Elementary – In 2008, vermiculite insulation was removed from the surface of the snow and soil at Asa Wood Elementary School after a piece of snow removal equipment punctured the cinderblock wall containing vermiculite insulation and insulation spilled out onto the ground.

- Libby Middle School – the track was excavated in 2001 and rebuilt in 2002. In 2004, gross amounts of vermiculite were observed and removed on a steep bank adjacent to Libby Middle School.

- Libby High School – the track and a portion of the tennis courts were excavated in 2001 and rebuilt in 2002.

Confirmation soil samples and air samples were collected as part of each excavation in accordance with the *Comprehensive Residential Removal Action Plan, Revision 2* (John A. Volpe National Transportation Systems Center [Volpe Center] 2002).

In June 2008, the five current public schools in Libby were inspected for visible vermiculite products and a limited number of exterior soil samples were collected. The objectives of these inspections were to 1) identify sources or exposure pathways within the interior and exterior portions of the school buildings, 2) delineate each

school into preliminary sampling zones based on shared airspaces and usage, and to 3) conduct outdoor inspections in areas of new construction and/or soil disturbances.

The inspections focused on identifying and documenting the location of vermiculite or vermiculite insulation within the buildings; checking open walls, ceilings, and floor penetrations for vermiculite insulation or vermiculite-containing building materials (VCBM); and inspecting outdoor walls and perimeter soils for vermiculite or vermiculite insulation. A detailed summary of the June 2008 school inspections, including figures illustrating the air zones and locations of source materials are available in *Libby Schools Visual Vermiculite Investigation Summary* (CDM 2008a), is provided in Appendix A.

2.2.1 Kootenai Valley Head Start

During the January 2000 investigations, four dust samples and four air indoor stationary air samples were collected. All analytical results for the dust and air samples were non-detect for LA.

During the June 2008 inspections, vermiculite was identified in two 5-gallon buckets of sand in a storage room south of the main gym area. One of the buckets had three toy shovels in it and a small quantity of this sand was spilled on the floor nearby. Vermiculite was also observed in the soil of a houseplant in the northwest office.

In September 2008, EPA contractors returned to the school and discovered one of the sand pails being used in a classroom. All pails of sand were removed from the school, the area surrounding the play table was vacuumed, and the carpet underneath the table was removed. Vermiculite insulation was also observed during this supplemental visit along the wall in the parent's waiting room. Presumably, the insulation came from the exterior cinderblock wall. A cleaning was performed in the supply closet in the parent's waiting room and the storage room at the south end of the gymnasium. Analytical results for the four soil samples collected from the sand pails were non-detect for LA. It was later determined that the play sand was locally purchased earlier in 2008 from a local hardware store. More detailed analytical results for these soil samples collected from Kootenai Valley Head Start are available in Table 2-2.

2.2.2 Asa Wood Elementary School

During the January 2000 investigations, six dust samples and six indoor stationary air samples were collected from the school during the initial inspection. Analytical results of all samples were non-detect for LA.

During the June 2008 inspections, vermiculite or vermiculite insulation was not observed during the interior and exterior perimeter inspection even though the cinderblock walls are known to contain vermiculite insulation. VCBM was identified in the form of wall plaster in the east wing and wall plaster at the north side of the stage. The plaster in both locations was in good condition and not friable.

2.2.3 Libby Middle School

During the January 2000 investigations, seven dust samples and eight indoor stationary air samples were collected from the school during the initial inspection. Analytical results of all samples were non-detect for LA.

During the June 2008 inspections, vermiculite was observed in two locations in the Yellow Wing of the school. One piece of vermiculite was identified underneath a sink and subsequently disposed of as investigation-derived waste (IDW). A potential source for the material could not be identified. Also, vermiculite was identified in a plastic planter pot in one of the classrooms.

2.2.4 Libby High School

During the January 2000 investigations, 10 dust samples and 11 indoor stationary air samples were collected from the school during the initial inspection. LA was detected in only the dust sample collected from the boiler room at a concentration of 322 structures per square centimeter (s/cm^2).All other air and dust samples were non-detect for LA.

Eight additional dust samples were collected from the outbuildings surrounding the track during the 2001 removal actions. The areas sampled include the football field storage building, snack bar, press box, visitors' coach box, storage garage, and bleachers. The elevated dust sample results triggered cleanings at each of these locations, and EPA purchased new football, track, and vending machine equipment for the school.

In October, 2001 a concern was raised regarding the dryers used to launder athletic uniforms at the school. The dryers were reportedly once owned by WR Grace. Four bulk samples were collected of the lint in the lint traps. All samples were non-detect for LA. More detailed analytical results for these bulk samples are available in Table 2-3.

During the June 2008 inspections, vermiculite was observed beneath the wood floors in the two greenhouses, in several plastic flowerpots, and two pieces were observed in outside soils at the northeast corner of the building.

The removal design for the soils within the greenhouse is being developed and is anticipated that removal actions will be completed during the winter break of December 2008.

2.2.5 Libby Administration Building

During the January 2000 investigations, five dust samples and five indoor stationary air samples were collected from the building during the initial inspection. Fifteen additional dust samples were collected in subsequent years (2 samples in 2001 and 13 samples in 2003) as part of the pre-design process to determine the need to perform interior cleaning activities as part of the bulk insulation removal. Of all the dust and

air samples collected, LA was detected in only one stationary air sample collected from the second floor hallway at a concentration of 0.0008 structures per cubic centimeter (s/cc) LA. The analytical results for all remaining air and dust samples were non-detect for LA.

In June 2001, seven bulk samples were collected of vermiculite insulation observed in the attic of the old portion of the building as well as vermiculite insulation observed in classrooms beneath recent electrical work. All material was identified as vermiculite; however, LA was detected in only two samples at concentrations of <1 percent LA while the remaining bulk samples were non-detect for LA. More detailed analytical results for these bulk samples are available in Table 2-3.

Interior removal activities began in July 2003 and were completed by the end of August 2003. Work performed consisted of insulation removal from the north addition attic and an interior cleaning of the storage room, and closet and entryway of the northeast classroom.

During the June 2008 inspections, vermiculite was not observed in the interior or the exterior of the building. However, VCBM was identified in the form of wall plaster located in the second floor storage room. The plaster was in good condition and not friable.

Section 3
Data Quality Objectives

The DQO process is a series of planning steps that are designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate for the intended purpose. EPA has issued guidelines to help data users develop Site-specific DQOs (EPA 2006). These guidelines were followed for the development of the DQOs presented in this section.

The DQO process specifies project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The DQO process consists of seven steps; output from each step influences the choices that will be made later in the process. These steps include:

1. State the problem
2. Identify the decision
3. Identify the inputs to the decision
4. Define the study boundaries
5. Develop a decision rule
6. Specify tolerable limits on decision errors
7. Optimize the design

3.1 Step 1 – State the Problem

As described in Section 2, a substantial amount of data have been collected to characterize the levels of LA in both indoor air and in outdoor soil at all of the schools in Libby, and cleanup activities have occurred in a number of cases. While confirmation sampling is performed after each removal action to ensure cleanup levels have been reached, a detailed post-cleanup evaluation has not been performed to confirm that current conditions achieve EPA's health protectiveness goals. Thus, the objective of this investigation is to obtain sufficient data to allow an evaluation of exposure and risk at Libby schools under present site conditions.

3.2 Step 2 – Identify the Decision

The decision to be made is whether or not risks to students, teachers, and staff from LA in schools and on school grounds in Libby are presently within acceptable bounds, and whether further investigations or additional cleanup actions are needed at one or more schools to ensure public health protectiveness from LA.

Note: In making this decision, it is important to emphasize that the basis for assessing the level of cancer risk from asbestos is currently undergoing Agency review, and the approach may be revised in the future as new methods are developed and as new toxicity data on asbestos are obtained. In addition, EPA has not yet developed a method for assessing non-cancer risks from inhalation exposure to asbestos. Thus, all evaluations of protectiveness that are based on currently available risk assessment methods should be viewed as interim, and these interim decisions may be revised in the future as methods and data for assessing the cancer and non-cancer risks of asbestos are improved.

3.3 Step 3 – Identify the Inputs to the Decision

Students, teachers, and staff at Libby schools may be exposed to LA in air either while inside the school building, or while engaged in outdoor activities on school grounds.

This document focuses on the collection of data needed to characterize exposures inside of the schools. A sampling plan to investigate potential exposures at outdoor locations on school grounds will be provided in a separate document.

The chief type of data needed to evaluate health risks to students, teachers, and staff while indoors consists of representative and reliable measures of the concentration of LA in indoor air under normal conditions when school is in session.

There are two alternative strategies for collecting air samples. In the first strategy, the air is collected using a pump worn by an individual, and the sampling cassette is placed in the breathing zone of the individual. This is referred to as personal air sampling. In the second strategy, the sampling pump is held on a fixed support, and the sampling cassette is placed at a height that is typical of what would be expected for a person engaged in normal activities in the general area of the sampler. This is referred to as stationary air sampling.

In general, personal samplers tend to measure higher levels of asbestos in air than stationary monitors, since the sample is collected in the immediate vicinity of the human activity that is causing a release to air. However, the magnitude of the difference between personal and stationary samples depends on the level of contamination and the level of disturbance of the source material. In workplace studies, a ratio (personal: stationary) of 2 is often suggested as the typical value, although the ratio can vary from about 1 to 10 (Steel 1979).

In Libby, two data sets are available to evaluate the potential difference between stationary and personal air samples. These data are shown in Figure 3-1. In the Phase II investigation (Figure 3-1, Panel A), there was relatively little difference, with personal samples tending to be higher than stationary samples by a factor of about 1.09. In the Supplemental Quality Assurance Project Plan [SQAPP] (EPA 2005) investigation (Figure 3-1, Panel B), the difference was somewhat larger, corresponding to a factor of about 7.8. The basis for the apparent difference between these two studies is not certain, but might be related to the fact that homes in the

SQAPP investigation contained known elevated levels of LA in indoor dust (>1,000 s/cm^2).

In the case of sampling indoor air in schools in Libby, only stationary air samples will be collected to limit disruption to classroom operations. Because the level of contamination in the schools is believed to be low, and because the level of human disturbance of source materials in a typical classroom setting is likely to be minimal, it is suspected that the air measurements collected using stationary monitors will likely be biased only slightly low compared to what would have been obtained had personal air samples been collected, similar to what was observed in the Phase II study (Figure 3-1, Panel A).

However, because the magnitude of the actual difference between stationary and personal air samples in the school setting is unknown, EPA will consider a follow-up study to supplement the stationary air measurements with a set of personal air samples worn by EPA staff or contractors. The potential need to collect such a set of samples will be determined after the data from the stationary air monitors are reviewed. If the concentrations measured by the stationary samplers are sufficiently low that risks would be below a level of concern even if personal air samples were higher by a factor of 2 to 10, then the follow-up study will not be considered necessary. If a follow-up study is judged to be necessary, the details of the study design will be provided in a separate SAP.

3.4 Step 4 – Define the Boundaries of the Study

3.4.1 Spatial Bounds

The investigation will include all public schools in Libby, including:

- Kootenai Valley Head Start – 247 Indian Head Rd
- Asa Wood Elementary School – 700 Idaho Ave
- Libby Middle School – 101 Ski Rd
- Libby High School – 150 Education Way
- Libby Administration Building – 724 Louisiana Ave

Indoor Stationary Air Sampling Locations

To ensure spatial representativeness of indoor air stationary samples, samples should be collected from multiple locations within each school building. In most cases this will include:

- Four classrooms
- Lunch room/cafeteria
- Gymnasium
- Four hallways

This would result in a total of about 10 locations per building.

The specific choice of rooms and sampling locations should be made on a school-by-school basis. In general, the rooms and locations should be selected to be representative of typical conditions in the school. However, if there is any reason to suspect a specific location might of special concern (e.g., a room is known to contain vermiculite in the plaster, vermiculite is known to be present in the wall insulation, etc.), these locations may be selected preferentially if students regularly access these areas. The proposed location of each sampling pump at each school is provided in Section 4.

In each sampling location, the sampling cassette should be placed at a level corresponding to the breathing zone of the students in the room. For example, in a classroom where students are usually seated at desks, the cassette would be placed at the height of the face of a seated student. Conversely, in the gymnasium and hallways, the cassettes would be placed at the height of a standing student.

3.4.2 Temporal Bounds

To ensure that all samples are representative of actual exposure conditions, each sample will be collected only during the times that the location is in typical use by students. For example, if a classroom were occupied by students approximately continuously from 8:00 AM to 3:00 PM, the sample would be collected only during this time period. Likewise, if the cafeteria is occupied between 11:00 AM and 1:00 PM, sampling would be restricted to this time interval. Sampling need not be interrupted for short and intermittent periods when the location is unused (e.g., changes between class periods).

Because the measure of importance in evaluating human health concern from indoor air exposure is the long-term average concentration at a location, it would be ideal if samples could be collected over many days to ensure temporal representativeness. However, it is not expected that there will be large variations over time in a school setting, so collection over many days is not thought to be critical in this case. Therefore, the samples collected in this study will be restricted to a time period of two sequential days. The sample generated at each location will be a composite over the two days, rather than two discrete samples.

3.5 Step 5 – Develop Decision Rules

Ideally, EPA would base its evaluation of exposures and risks from LA in schools on the total cancer and non-cancer risk experienced by students and teachers including not only exposures that occur in the school, but also including all other exposures that occur in Libby. That is, if the cumulative level of risk to students and teachers from exposure to indoor air at schools, when combined with the level of risk which applies to the same individuals from other applicable exposure pathways, did not exceed a cancer risk of 1E-04 or a non-cancer Hazard Quotient of 1.0, then risks at that school would be considered acceptable. However, quantitative estimates of risk from other exposures that may occur in and about the community of Libby (e.g., ambient air, exposures in the home, at public areas, etc.) are not presently available, and there is

no method currently available for quantification of non-cancer risk. For these reasons, EPA will make decisions about risks in schools based on a target cancer risk of 1E-05. This value is selected to provide a margin of safety to account for cumulative exposures from non-school sources, as well as for the lack of a method for quantification of non-cancer risks. Based on this, the decision rule is:

> If the total level of excess cancer risk to students and teachers from reasonable maximum exposure to indoor air and outdoor ABS air at a school does not exceed 1E-05, then risks at that school will be considered acceptable. If the risk exceeds a value of 1E-05, then the school will be considered potentially unsafe for long-term human use and EPA will assess options for reducing exposure.

3.6 Step 6 - Specify Tolerable Limits on Decision Errors

In making decisions about the long-term average concentration of LA in indoor air and the level of health risk associated with that exposure, two types of decision errors are possible:

- A false negative decision error occurs if a risk manager decides that exposure to LA in indoor air is not of significant health concern, when in fact it is of concern.
- A false positive decision error occurs if a risk manager decides that exposure to LA in indoor air is above a level of concern, when in fact it is not.

EPA is most concerned about guarding against the occurrence of false negative decision errors, since an error of this type may leave humans exposed to unacceptable levels of LA at schools. For this reason, it is anticipated that decisions regarding this pathway will be based not only on the best estimate of the long term average concentration, but will also consider the 95% upper confidence limit (UCL) of the long-term average concentration. Use of the UCL to estimate exposure and risk helps account for limitations in the data, and provides a margin of safety in the risk calculations, ensuring that risk estimates are unlikely to be too low.

EPA is also concerned with the probability of making false positive decision errors. Although this type of decision error does not result in unacceptable human exposure, it may result in unnecessary expenditure of resources. For the purposes of this effort, the strategy adopted for controlling false positive decision errors is to seek to ensure that, if the exposure estimate based on the mean is less than 1/3 the level of concern but the value based on the 95% UCL is above EPA's level of concern, then it will be concluded that there is a substantial probability of a false positive decision error and that more data may be needed to strengthen decision-making.

3.7 Step 7 - Optimize the Design for Obtaining Data

3.7.1 Estimating the Number of Samples

The method used to compute the UCL of a set of air samples depends on the statistical properties of the data set. If it is assumed that the variability between

different samples is likely to be approximately lognormal, then the data set collected from a location or a set of similar locations may be approximated by a mixed Poisson lognormal (PLN) distribution. At present, the EPA has not established a method for quantifying the uncertainty in the mean of a data set drawn from a PLN distribution, so it is not currently possible to perform a quantitative analysis of decision error rates as a function of sample size. However, it is known that the magnitude of the uncertainty around an observed sample mean depends on three key variables:

1. As the variability in the underlying distribution increases, uncertainty increases.

2. As the number of samples collected increases, uncertainty decreases.

3. As the average number of structures counted per sample (lamda) increases, uncertainty decreases.

The relationship between these three variables and the sampling distribution of the mean of a PLN can be characterized using Monte Carlo simulation. For the purposes of this effort, the underlying distribution was assumed to be lognormal with a geometric standard deviation (GSD) of 3, 6, or 10. Random data sets of varying sample size (5 to 80) were drawn. Each sample was assumed to be analyzed by a procedure with random Poisson counting error, with the average number of particles counted per analysis (lamda) ranging from 3 to 20. The mean of each simulated data set was computed, and divided by the true mean in order to normalize the values.

The results (presented as the range from the 5th percentile to the 95th percentile of the ratio of the simulated mean divided by the true mean) are shown in Figure 3-2. As seen, relatively little reduction in variability is gained by increasing lamda above a value of about 3, so analytical strategies designed to yield an average of 3 or more countable structures per sample are considered appropriate. The number of samples needed to limit the uncertainty in the mean to an acceptable level depends on how close the mean is to the decision criterion and on the degree of underlying variability (as reflected in the GSD). If the GSD is not excessive (e.g., about 3-6), and if the mean is well removed from a level of concern (e.g., more than a factor of 3), then the number of samples needed is likely on the order of 10 to 15, depending on the degree of underlying variability. If the mean is close to a level of concern (e.g., less than a factor of 2), then the number of samples needed is likely on the order of at least 25 to 50, depending on the underlying variability (GSD).

At present, data are not available to estimate how close the mean concentration of LA is to a level of concern in either indoor or outdoor air at schools, or on the magnitude of the underlying variability. In the absence of such data, the target number of samples for indoor air to be collected at each school is about 20. (Note that a set of 10 samples, with each sample being a composite of two sampling days, is equivalent to a set of 20 individual samples). A sample set of this type should be sufficient to support decision making if variability is not too high (GSD $\approx$ 3) and if the observed mean concentration is not too close to decision thresholds (e.g., less than 1/3 the level of

concern). Additional sampling may be needed to support decision-making if between-sample variability is high (e.g., GSD > 3) and/or observed means are close to decision thresholds (e.g., sample mean is within 3-fold of the decision threshold). This evaluation will be guided by the relationships illustrated in Figure 3-2.

3.7.2 Estimating the Required Analytical Sensitivity

For the purposes of this effort, the analytical sensitivity that is needed for analysis of indoor air samples from schools should be sufficient to ensure reliable detection and quantification of LA if risks from indoor air approach or exceed a level of health concern. As noted above, the level of concern selected for decision-making is 1E-05.

The first step in selecting the target sensitivity is to compute the concentration of LA in air that would equal a risk of 1E-05. This value is calculated from the basic risk model recommended by EPA, as follows:

$$Risk(i) = C(i) \bullet TWF(i) \bullet UR(i)$$

where:

Risk(i) = Risk of dying from a cancer that results as a consequence of exposure from specified exposure scenario "i"

C(i) = Average concentration of asbestos structures in air (s/cc) during exposure scenario "i"

UR(i) = Unit Risk $(s/cc)^{-1}$ that is appropriate for exposure scenario "i"

TWF(i) = Time weighting factor for exposure scenario "i". This factor accounts for less-than-continuous exposure during the exposure interval.

Solving this equation for the value of C(air) that corresponds to a risk of 1E-05 yields:

$$C(air) = 1E\text{-}05 / (TWF \bullet UR)$$

Note that the type of fibers included in this concentration is defined by the risk model. For example, the current EPA approach is based on phase contrast microscopy (PCM) fibers, which are defined as asbestos fibers with length longer than 5 µm, thickness greater than or equal to 0.25 µm, and aspect ratio greater than or equal to 3:1. For convenience, the fibers used in a risk model are called risk-based fibers.

In most cases, the risk-based fibers are only a sub-set of the total asbestos fibers present in air. The fraction of fibers that are risk-based is referred to as the risk-based fraction (RBF):

$$RBF = C(risk\text{-}based) / C(total)$$

At the Site, current analytical methods focus on measuring the concentration of total fibers, and sufficient data have accumulated to estimate the RBF with good accuracy. Thus, the concentration of PCM fibers may be calculated from a measure of total fibers as follows:

C(risk-based) = C(total) • RBF

This approach provides an estimate of the concentration of risk-based fibers that has lower statistical uncertainty than if only risk-based fibers were measured, and may be applied to any risk model that may be of interest.

Based on this approach, the concentration of concern of total asbestos associated with a specified risk level (1E-05) is calculated as follows:

C(Risk-based) (Total TEM s/cc) = (1E-05) / (RBF • TWF • UR)

For students and teachers, the values of TWF are assumed to be as follows:

Parameter	Students	Teachers
ET (hrs/day)	7	8
EF (days/yr)	200	210
TWF	0.160	0.192

As described in EPA (2008), the value of UR depends on the age at first exposure and the duration of exposure. For students, the age at start is assumed to be 5 years, since this is the age when most children begin to attend school on a regular basis. The exposure duration is assumed to be 12 years. For teachers, it is assumed teaching begins at age 20 and lasts for 25 years. The corresponding UR values are shown below:

Parameter	Students	Teachers
Age at start	5	20
Duration	12	25
UR (PCM s/cc)$^{-1}$	0.080	0.069

The value of RBF (the fraction of total LA fibers that are PCM equivalent fibers) for indoor air in schools in Libby is not known, but it is expected to be approximately similar to values that have been observed in air samples collected at other parts of the Site:

$RBF \approx 0.45$

Based on these inputs, the concentration of total LA in indoor air samples from schools in Libby that corresponds to a risk of 1E-05 is calculated as:

Student:

C(air) = (1E-05) / (0.45 • 0.16 • 0.080) = 0.0017 s/cc

Teacher:

$$C(air) = (1E\text{-}05) / (0.45 \bullet 0.19 \bullet 0.069) = 0.0017 \text{ s/cc}$$

As seen, a concentration of 0.0017 total LA fibers per cubic centimeter (f/cc) is the level of concern for both teachers and students.

For this effort, the target sensitivity is set to a value about 1/3 that of the risk-based concentration:

$$\text{Sensitivity} = 0.0017 \text{ f/cc} / 3 \approx 0.0006 \text{ cc}^{-1}$$

The choice of a sensitivity 1/3 lower than the risk based concentration helps ensure that if the true concentration approaches or exceeds the level corresponding to a 1E-05 risk level, the average number of LA structures observed and counted in samples would be 3 or more, which helps minimize statistical uncertainty in the data set.

Section 4
Sampling Program

This section provides the details related to the sampling program required to meet the DQOs (Section 3).

4.1 Pre-Sampling Activities

Prior to beginning field sampling activities, a field planning meeting will be conducted, any required trainings will be conducted, and an inventory of equipment and supplies will be performed to ensure that all necessary supplies and equipment are available and in good working order.

4.1.1 Field Planning Meeting

The field planning meeting will be conducted by the assigned CDM field team leader (FTL) and attended by the field staff, a member of the CDM QA staff, a member of the CDM field health and safety staff. The EPA remedial project manager and Volpe Center site manager will be notified of the meeting's date and time. The agenda will be reviewed and approved by the QA staff and the health and safety officer prior to the meeting. The meeting will briefly discuss and clarify the following:

- Objectives and scope of the fieldwork
- Equipment and training needs
- Field operating procedures, schedules of events, and individual assignments
- Required quality control (QC) measures
- Health and safety requirements
- Documents governing fieldwork that must be on site
- Any changes in the field planning documents

A written agenda, reviewed by the CDM QA staff, will be distributed and an attendance list signed. Copies of these documents are maintained in the project files, in the CDM Denver, CO office. Additional meetings will be held when required by the documents governing fieldwork or when the scope of the assignment changes significantly. The field team personnel will perform the following activities before and during field activities, as applicable:

- Review and understand applicable governing documents
- Ensure that all sample analyses are scheduled through the laboratory
- Obtain required sample containers and other supplies
- Obtain and check field sampling equipment
- Obtain and maintain personal protective equipment (PPE)

4.1.2 Training Requirements

Prior to starting work at the Libby field office, any new team member must complete the following, at a minimum:

- Read the Comprehensive Site Health and Safety Program (CDM 2006) - documented on plan signature sheet and required reading report
- Read the Libby Asbestos Project Health and Safety Plan (HASP) (CDM 2008b) - documented on plan signature sheet and required reading report
- Read the HASP for Initial Public School Sampling - documented on plan signature sheet and required reading report
- Attend an orientation session with the site health and safety officer - documented on orientation session attendance sheet
- Read and understand all relevant governing documents - documented on required reading report
- Occupational Safety and Health Administration 40 hour Hazardous Waste Operations and Emergency Response (HAZWOPER) and relevant 8 hour refreshers - documented by training certificates
- Current 40 hour HAZWOPER Medical Clearance
- Respiratory protection training as required by 29 Code of Federal Regulations (CFR) 1910.134 - documented by training certificate
- Asbestos awareness training as required by 29 CFR 1910.1001 - documented by training certificate
- Sample collection techniques - documented by logbook entries

All training documentation will be stored in the Libby project files.

4.1.3 Inventory and Procurement of Equipment and Supplies

The following equipment will be required for sampling activities, and any required equipment not already contained in the field equipment supply inventory will be procured prior to initiation of sampling activities:

- Field logbook
- Indelible ink pen
- Digital camera

- Air sampling equipment: 25 millimeter (mm) diameter mixed cellulose ester (MCE) filter cassette (0.8 micrometer (µm) pore), flow rate, wall-powered air sampling pump, rotameter, Tripod stand
- Sample paperwork and sample tags/labels
- Custody seal
- Zipper-top baggies
- PPE as required by the HASP

4.1.4 Identify Sampling Locations

Sampling locations were based on interviews with school administrators indicating the areas with heaviest use while also incorporating delineations of air zones determined in the June 2008 inspections (Appendix A). These sample locations also represent the typical conditions in each school. For example, at the early childhood education schools (i.e., Kootenai Valley Head Start, Asa Wood) the students remain in the classrooms during lunch breaks and do not move to a common area. Additionally, the Libby Administration Building does not have a gymnasium and Kootenai Valley Head Start only utilizes four classrooms daily. When possible, additional classrooms were selected for sampling. Figures 4-1 through 4-6 depict the locations selected at each school.

4.2 Sample Collection

This section describes the investigation efforts that will be conducted to meet the objectives of this SAP.

4.2.1 Air Sample Collection

Stationary air samples will be collected for each of the five schools from 10 high flow rate air sampling pumps positioned at the predetermined locations. The total number of samples (50) is expected to yield an estimate of the mean concentration that has acceptable uncertainty bounds (see Figure 3-2).

Standard operating procedure (SOP) EPA-Libby-01, Revision 1, March 2001 will be used for collection of stationary air samples during this effort. A copy of this SOP is presented in Appendix B. All air samples will be collected using cassettes that contain a 25 mm diameter MCE filter with a pore size of 0.8 µm.

The air sampling pumps will be placed in such a way to not interfere with normal school activities, either through noise or tripping hazards. The stationary air samples will be collected using wall-powered sampling pumps capable of operating at high flow rates. The specific model selected for this sampling event is GAST Model 1532 rotary vane pump. The purpose of these samples is to evaluate the concentrations in air that might be inhaled particularly by students attending each school, and the monitoring cassette will be placed at a distance above the ground representing the

height of the average student. In classroom settings, the monitoring cassette will represent the height of a seated student. The top cover from the cowl extension on the sampling cassette shall be removed ("open-face") and the cassette oriented face down.

During extended periods of inactivity in classrooms and common areas (i.e., gymnasium, cafeteria) sampling will be suspended until students return to this space. Hallways and other areas that are used intermittently utilized (i.e., library) will be sampled for the entire school day.

Sampling will continue over two sequential days. Although sampling pumps will be removed at the end of the first day, the same locations and monitoring cassettes will be used for the second day of sampling.

Sampling pump flow rates will be adjusted to 10 liters (L)/minute and the sampling duration will depend on the length of time that each area is occupied by students, teachers, or staff. It is anticipated that air samples will be collected a minimum of 2 hours and a maximum of 8 hours on each day of air sampling, yielding sample volumes of approximately 2,400 L and 9,600 L, respectively.

4.2.2 Pump Calibration

Each air sampling pump will be calibrated at the start and end of each day's sampling period using a rotameter that has been calibrated to a primary calibration source. The primary calibration standard used at the Site is a Bios DryCal® DC-Lite. For pre-sampling purposes, calibration will be considered complete when ±5 percent of the desired flow rate is attained, as determined by three measurements with the calibrator using a cassette reserved for calibration (from the same lot of the sample cassettes to be used in the field). For post-sampling, three separate constant flow calibration readings will be obtained with the sampling cassette inline and those flow readings will be averaged. If the flow rate changes by more than 5 percent during the sampling period, the average of the pre- and post-sampling rates will be used to calculate the total sample volume.

Samples for which there is more than a 25 percent difference from initial calibration to end calibration will be invalidated. The sample collector will record the pump serial number, sample number, initial flow rate, sample start/end times, sample locations, and final flow rate in the field logbook and on a field sample data sheet (FSDS).

To prevent potential cross-contamination, each rotameter used for field calibration will be transported to and from each sampling location in a sealed zip-top plastic bag. The cap used at the end of the rotameter tubing will be replaced each morning after it is used.

4.3 General Processes

This section describes the general field processes that will be used to support the sampling described in this SAP and includes references to CDM SOPs and

investigation-specific modifications to established project procedures when applicable.

4.3.1 Sample Labeling and Identification

Samples will be labeled with index identification numbers supplied by field administrative staff, and will be signed out by the sampling teams (i.e., controlled). For air samples, one sample label will be placed on the sampling cassette and the sample identification number will also be written on the outside of the plastic bag used to hold the sampling cassette during transport.

Sample index identification numbers will identify the samples collected during this sampling effort by having the following format:

SI-#####

where:

SI = School Investigation

= A sequential five digit number

4.3.2 Field Logbooks

Field logbooks will be maintained in accordance with CDM SOP 4-1, Field Logbook Content and Control with project-specific modifications (Appendix B). The log is an accounting of activities at the site and will duly note problems or deviations from the governing plans and observations related to the SAP.

As described in CDM SOP 4-1, logbook modifications will be completed with a single line strikeout, initial, and date. The correct information should be entered in close proximity to the erroneous entry.

Field logbooks will be completed daily prior to leaving the site. Field logbooks will be checked for completeness and adherence to CDM SOP 4-1, on a daily basis for the first week of each new activity. When incorrect logbook completion procedures are discovered during these checks, the errors will be discussed with the author of the entry and corrected.

The field administrative staff will manage the logbooks by assigning unique identification numbers to each logbook, tracking who each logbook was assigned to, the investigation activities to be recorded in each logbook, the date the logbook was signed out, and the date the logbook was returned. As logbooks are completed, originals will be maintained in the CDM office in Libby, Montana and copies will be sent for archive to the CDM office in Denver, Colorado. Copies of logbooks will be provided to EPA and Syracuse Research Corporation (SRC) within one month after the completion of the sampling event. Electronic copies of all logbooks are suitable and will be placed in the project e-room.

4.3.3 FSDSs

Detailed sampling notes as required by media-specific FSDSs will be recorded for each field and QC sample. FSDSs are property-specific and up to three individual samples can be recorded on a FSDS from the same property. If columns are left incomplete due to less than three samples being recorded on a sheet, the blank columns will be "Z'ed" out and signed by the staff member completing the sheet. Modifications will be completed with a single line strikeout, initial, and date. For any information mistakenly recorded on a sheet. The correct information should be entered in close proximity to the erroneous entry.

FSDSs will be completed in the field before leaving the sampling location. To ensure that all applicable data is entered and all necessary fields are completed, a different field team member will check each FSDS. Initials are placed on the FSDS indicating the team member who completed the form and the team member who checked the form. In addition, the FTL will also complete periodic checks of FSDS prior to relinquishment to the sample coordinator. Once FSDSs are relinquished to the sample coordination staff, the sheets are again checked for accuracy and completeness. Initials are recorded on the sheet for the member of the sample coordination staff completing the check and data entry of required information into the project sample tracking database, eLASTIC.

During any of these checks, if a revision is required to the FSDS, it will be returned to the team member initially responsible for its completion. The error will be explained to the team member and the sheet corrected.

Each media-specific sheet is assigned a unique identification number. This number will be referenced in logbook entries related to samples recorded on individual sheets. Field administrative staff will manage the FSDSs and will send copies of completed sheets to the project repository at the CDM office in Denver, CO. Original sheets will be filed in the CDM office in Libby, MT office by media and individual sheet number.

A copy of the FSDSs that will be used to record information collected during the activities described in this SAP are shown in Appendix C. Copies of FSDSs will be provided to EPA and SRC within one month after the completion of the sampling event. Electronic copies are suitable and will be placed in the project e-room.

4.3.4 Photographic Documentation

Photographs will be collected to document sampling locations and site conditions during sampling activities and at any other place the field sampling personnel determine necessary, with a digital camera in accordance with CDM SOP 4-2, Photographic Documentation of Field Activities (Appendix B) with the project-specific modifications.

Digital photographs will be archived on the CDM Libby Server (secure) with nightly backup. These files will be archived until project closeout, at which point project management will determine a long-term electronic file storage system. Electronic

captions will be used to describe the photographs instead of maintaining photographic logs in daily logbook entries. File names will be in the format:

School name_Address_SI 2008_date

where:

SI 2008 indicates 2008 School Investigation
The date is formatted as MM-DD-YY

4.3.5 GPS Point Collection

For air samples collected as part of this sampling effort the global positioning system (GPS) point associated with the samples will be the GPS point assigned to the building in which the samples are collected. All of the schools included in this sampling effort have a pre-existing GPS point collected.

4.3.6 Field Equipment Maintenance

Field equipment maintenance will be conducted and documented as described in CDM SOP 5-1, Control of Measurement and Test Equipment (Appendix B).

When a piece of equipment is found to be operating incorrectly, the piece of equipment will be labeled out-of-order and placed in a separate area from the rest of the sampling equipment. The person who identified the equipment as out-of-order will notify the FTL overseeing the investigation activities. It is the responsibility of the FTL to facilitate repair of the equipment. This may include having appropriately trained field team members complete the repair or shipment to the manufacturer.

4.3.7 Equipment Decontamination

Decontamination of air sampling pumps will be conducted in accordance with CDM SOP 4-5, Field Equipment Decontamination at Non-radioactive Sites, with project specific modifications (Appendix B). Materials used in the decontamination process will be disposed of as IDW as described below.

4.3.8 Handling IDW

Any disposable equipment or other IDW will be handled in accordance with CDM SOP 2-2 with project-specific modifications, Guide to Handling of IDW (Appendix B).

During periodic evaluations conducted by the FTL, IDW handling will be evaluated. If handling procedures are not following CDM SOP 2-2 and project-specific requirements, the field teams observed will be re-instructed on correct handling procedures.

4.3.9 Field Sample Custody and Documentation

Field sample custody and documentation will follow the requirements as stated in CDM SOP 1-2, Sample Custody with project-specific modification (Appendix B). The

chain of custody (COC) is used as physical evidence of sample custody and control. This record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. A complete COC is required to accompany each shipment of samples.

At the end of each day, all samples will be relinquished to the sample coordinator by the sampling team following COC procedures, and an entry will be made into the logbook indicating the time samples were relinquished. The sample coordinator will follow COC procedures to ensure proper sample custody from acceptance of the sample from the field teams to shipment to the laboratory.

The sample coordinator assistant will use the FSDS to complete an electronic COC (eCOC). The sample coordinator will use the data entered to create the eCOC and verify the data against the FSDSs. Three paper copies of the eCOC will then be generated. One copy will be filed in the CDM office in Libby, MT and the other two will accompany the sample shipment. If any errors are found on an eCOC after shipment, the paper copy of the COC stored in Libby will be corrected by the sample coordinator with a single line strikeout, initial, and date. The corrected copy will be faxed to the Volpe Center in Cambridge, MA and the receiving laboratory. The fax to the Volpe Center will be used to update the Libby2 database.

Copies of all COC forms will be provided to EPA and SRC within one month after the completion of the sampling event. Electronic copies are suitable and will be placed in the project e-room.

4.3.10 Laboratory Coordination

In order to clearly differentiate the samples collected for this investigation, each COC will reference the SAP-specific Summary of Preparation and Analytical Requirements for Asbestos (provided in Appendix D) in the comments section for each sample. In addition, each COC will be appended with this analytical summary sheet.

4.3.11 Sample Packaging and Shipping

Samples will be packaged and shipped in accordance with CDM's SOP 2-1, Packaging and Shipping of Environmental Samples (Appendix B), with project-specific modifications. For air samples, a custody seal will be placed so that both ends of the sampling cassette are covered by the seal. Custody seals will be placed over at least two sides of the cooler and then secured by tape if samples are released to a non-sampler. The sample coordinator will check the COC versus the samples in the shipment to ensure the COC matches shipment contents.

The sample coordinator will be responsible for shipment of samples. All samples will be shipped by an overnight delivery service to the laboratory designated by the CDM laboratory coordinator or hand-delivered to the onsite laboratory. Vermiculite, shredded paper, or expanded polystyrene cannot be used as packing material.

4.3.12 Modification Documentation

All deviations from this SAP and associated guidance documents will be recorded on the Libby Asbestos Project Record of Modification Form (Appendix E). The Record of Modification Form will be used to document all permanent and temporary changes to procedures contained in guidance documents governing investigation work. In addition, the Record of Modification Form will be used to document any information of interest as requested by EPA project management. As modifications to governing documents are implemented, the FTL will communicate the changes to the field teams conducting activities associated with the modification. When the EPA project management team determines the need, revised governing documents may be issued to incorporate modifications.

Record of Modification Forms are completed by the FTL overseeing the investigation. Once a form is completed a technical review is completed by the Volpe Center project manager or designate, and then reviewed and approved by the EPA project leader or designate.

A record is kept to track the person who completed each form and a brief description of the modification documented on each form. Each completed Record of Modification Form is assigned a unique identification number and maintained at the CDM office in Libby, Montana by the data manager.

4.3.13 Field Surveillances and Audits

The quality of field processes is evaluated by field surveillances and audits conducted by CDM and/or EPA. This section describes each of these evaluations.

Field surveillances consist of periodic observations made to evaluate continued adherence to investigation-specific governing documents. Field surveillances are conducted for each investigation conducted at the Site, and are most often performed by the CDM investigation field manager (IFM) or investigation assigned FTL.

The schedule for performing field surveillances is dependent on the duration of the investigation, frequency of execution, and magnitude of process changes. At a minimum, field surveillance will be performed daily during the first week of implementation. Following the first week, surveillances will be conducted once a month or as necessary when field processes are revised or other QA/QC procedures indicate potential deficiencies.

When deficiencies are observed during the surveillances, the observer will immediately discuss the observation with the field team member and retrain the team member if required. If the observer finds deficiencies across multiple field members or teams, the IFM or FTL will plan and hold an investigation-specific field meeting. At this meeting the observations made will be discussed as well as any corrective actions required (i.e., retraining).

The observer will document that surveillances have occurred in the appropriate field logbook. The logbook will also be used to record any field meetings that were conducted including topics discussed, person conducting the meeting, and field team members attending the meeting.

Field audits are broader in scope than surveillances and are independent evaluations conducted by qualified technical or QA staff that are independent of the activities audited. Field audits can be conducted by CDM, internal EPA staff, or EPA contracted auditors. Due to the brevity of the school sampling, a field audit is not anticipated.

4.4 QA/QC Activities

QA/QC samples will be collected for air samples according to the procedures and at the frequencies described below. It is expected that drying air sample cassettes will not be required for this activity given the low relative humidity conditions in which sampling will take place. Co-located samples will not be collected due to the replication of air sample locations within each school. Table 4-1 summarizes the collection frequency for QA samples and indicates corrective actions that may be required based on their results.

Lot blanks – Before samples are collected, cassette lot blanks from each filter lot will be randomly selected and submitted for analysis at a minimum frequency of one lot blank per 500 cassettes. The lot blanks will be analyzed for asbestos fibers by the same method as will be used for field sample analysis. The entire batch of cassettes will be rejected if any asbestos fiber is detected on the lot blanks. Only lots of filters with acceptable lot blank results are placed in the general supply area for use by project personnel.

Field blanks – The collection frequency for field blanks will be one field blank per school for each day when activities are conducted. Field blanks are collected by opening the sample cassette to the ambient environment for 5 to 30 seconds then re-capping the sample cassette. The field blanks will be analyzed for asbestos fibers by the same method as will be used for field sample analysis. It is expected, based on historical analyses of field blanks, asbestos structures will only be observed on field blanks on very rare occasions. If any asbestos structure is observed on a field blank, the Libby2 database will be used to correlate the field blanks to the related field samples. Based on this correlation, a qualifier of "FB" will be added to the results of all samples associated to a field blank with asbestos structures.

Section 5
Laboratory Analysis and Requirements

The laboratories used for all sample analysis will have participated in, and acceptably analyzed, the required parameters in the last two proficiency examinations from the National Institute of Standards and Technology/National Voluntary Laboratory Accreditation Program. The laboratory must also analyze project specific performance evaluation samples or other reference materials when requested. These analyses must be performed before any samples are submitted to the laboratory to confirm the laboratory's capabilities and may be subsequently submitted at regular intervals. In addition, the laboratory must participate in the laboratory training program developed by the Libby laboratory team.

5.1 Analytical Methods

All air samples collected during this effort will be submitted for asbestos analysis using TEM in accord with the ISO 10312 method (ISO 1995) counting protocols, with all applicable Libby site-specific laboratory modifications, including the most recent versions of modifications LB-000016, LB-000019, LB-000028, LB-000029, LB-000030, LB-000031, LB-000053, LB-000066, LB-000084, and LB-000085. All asbestos structures (including not only LA but all other asbestos types as well) that have appropriate Selective Area Electron Diffraction patterns and Energy Dispersive X-Ray Analysis spectra, and having length greater than or equal to 0.5 µm and an aspect ratio (length:width) ≥ 3:1, will be recorded on the Libby site-specific laboratory bench sheets and electronic data deliverable (EDD) spreadsheets.

5.2 Stopping Rules

Field Samples

The initial stopping rules for this sampling program are as follows:

Count the sample until one of the following is achieved:

- The target sensitivity (0.0006 cc^{-1}) is achieved
- Twenty-five LA structures are observed
- An area of 0.5 mm^2 of filter has been examined

When one of these goals is achieved, complete the final grid opening and stop.

Field Blanks and Lot Blanks

For field blanks and lot blanks, count an area of 0.1 mm^2 and stop.

Estimated Filter Area and Grid Opening Requirements

Assuming that all samples may be analyzed using a direct preparation method, the area of the filter that must be evaluated to achieve the target sensitivity depends on the size of the filter and the volume of air drawn through the filter, as follows:

$$Area = \frac{EFA}{TS \cdot V \cdot 1000}$$

where:

Area	=	Area of the filter that must be evaluated to achieve the target sensitivity (mm^2)
EFA	=	Effective filter area (mm^2)
TS	=	Target sensitivity (cc^{-1})
V	=	Volume of air drawn through the filter (L)
1000	=	cc per L

Assuming that a typical air sample is collected at a flow rate of about 10 L/minute for a time period of about 2-8 hours/day for 2 days, the volume will be about 2,400 to 9,600 L. For a filter with an EFA of 385 mm^2, the area requiring analysis to achieve a target sensitivity of 0.0006 cc^{-1} is about 0.13 mm^2. Assuming that one grid opening has an area of about 0.01 mm^2, each analysis will require a total of about 7-27 grid openings to achieve the target sensitivity.

5.3 Holding Times

No preservation requirements or holding times are established for air samples collected for asbestos analysis.

5.4 Laboratory Custody Procedures and Documentation

Laboratory custody procedures are provided in the laboratories' QA management plan, which are reviewed by CDM as part of the laboratory procurement process and were independently audited and found to be satisfactory by EPA's Laboratory Audit team.

The basic laboratory sample custody process is as described herein. Upon receipt at the laboratory, each sample shipment will be inspected to assess the condition of the shipment and the individual samples. This inspection will include verifying sample integrity. The accompanying COC records will be cross-referenced with all of the samples in the shipment. The laboratory sample custodian will sign the COC records and maintain a copy for their project files; the original COC will be appended to the hard copy data report that is sent to CDM's laboratory coordinator. Next, the sample custodian may continue the COC record process by assigning a unique laboratory number to each sample on receipt. This number, if assigned, will identify the sample through all further handling at the laboratory. It is the laboratory's responsibility to maintain internal logbooks and records throughout sample preparation, analysis, and data reporting.

5.5 Documentation and Records

Laboratory documentation and records will follow the requirements outlined below.

5.5.1 Analytical Data Reports

Data reports for all samples will be submitted to the CDM laboratory coordinator and include a case narrative that briefly describes the number of samples, the analyses, and any analytical difficulties or QA/QC issues associated with the submitted samples. The data report will also include signed COC forms, analytical data summary report pages, a QC package, and raw data, where applicable. Raw data is to consist of instrument preparation logs, instrument printouts, and QC sample results including, instrument maintenance records, COC check in and tracking, raw data instrument print outs of sample results, analysis run logs, and sample preparation logs. All original data reports will be filed in the CDM office in Denver, Colorado. The laboratory also will provide an electronic copy of the data to the laboratory coordinator and others as directed by CDM.

5.5.2 Laboratory Data Entry Spreadsheets

Standardized data entry spreadsheets (EDDs) were developed specifically for the Libby project to ensure consistency between laboratories in the presentation and submittal of analytical data. In general, a unique data entry MSExcel workbook template was developed for each type of analytical method (TEM, PCM, PLM). Since the beginning of the Libby project, the EDD has evolved to better accommodate the present and future needs of data handling, retrieval, and interpretation. An on-going refinement of the EDD continues based on laboratory and data user input.

The EDD template contains a variety of built-in quality control functions that improve accuracy of data entry and help maintain data integrity. For example, data entry forms utilize drop-down menus whenever possible to standardize data inputs and prevent transcription errors. In addition, many data input cells are coded to highlight omissions, apparent inconsistencies, or unexpected values so that data entry personnel can check and correct any errors before submittal of the EDD. The spreadsheet workbook also performs automatic computations of sensitivity, dilution factors, and concentration, thus reducing the likelihood of analyst calculation errors. The EDD was designed to directly upload data into the project database, avoiding any additional data entry requirements.

5.5.3 Modification Forms

All deviations from project specific and method guidance documents will be recorded on the Libby Asbestos Project Record of Modification Form to Laboratory Activities. The Record of Modification Form will be used to document all permanent and temporary changes to analytical procedures. In addition, the Record of Modification Form will be used to document any information of interest as requested by EPA project management. As modifications are implemented, the laboratory coordinator will communicate the changes to the project laboratories.

Record of Modification Forms are completed by the case manager assigned by each laboratory to the Libby project or their designate. Once a form is completed a technical review is completed by the laboratory and the Volpe Center project manager or designate, and then reviewed and approved by the EPA project leader or designate.

A record is kept to track the person who completed each form and a brief description of the modification documented on each form. Each completed Record of Modification Form is assigned a unique identification number and maintained by the CDM laboratory coordinator.

5.6 Data Management

Sample results data will be delivered to the Volpe Center in Cambridge, Massachusetts and CDM's Cambridge, Massachusetts office both in hard copy and as an EDD in the most recent project-specific format. Electronic copies of all project deliverables, including graphics, will be filed by project number. Electronic files will be routinely backed up and archived according to individual laboratory processes.

All results, field data sheet information, and survey forms will be maintained in the Libby project database managed by the Volpe Center under the oversight of the Volpe Center database management team.

Section 6
References

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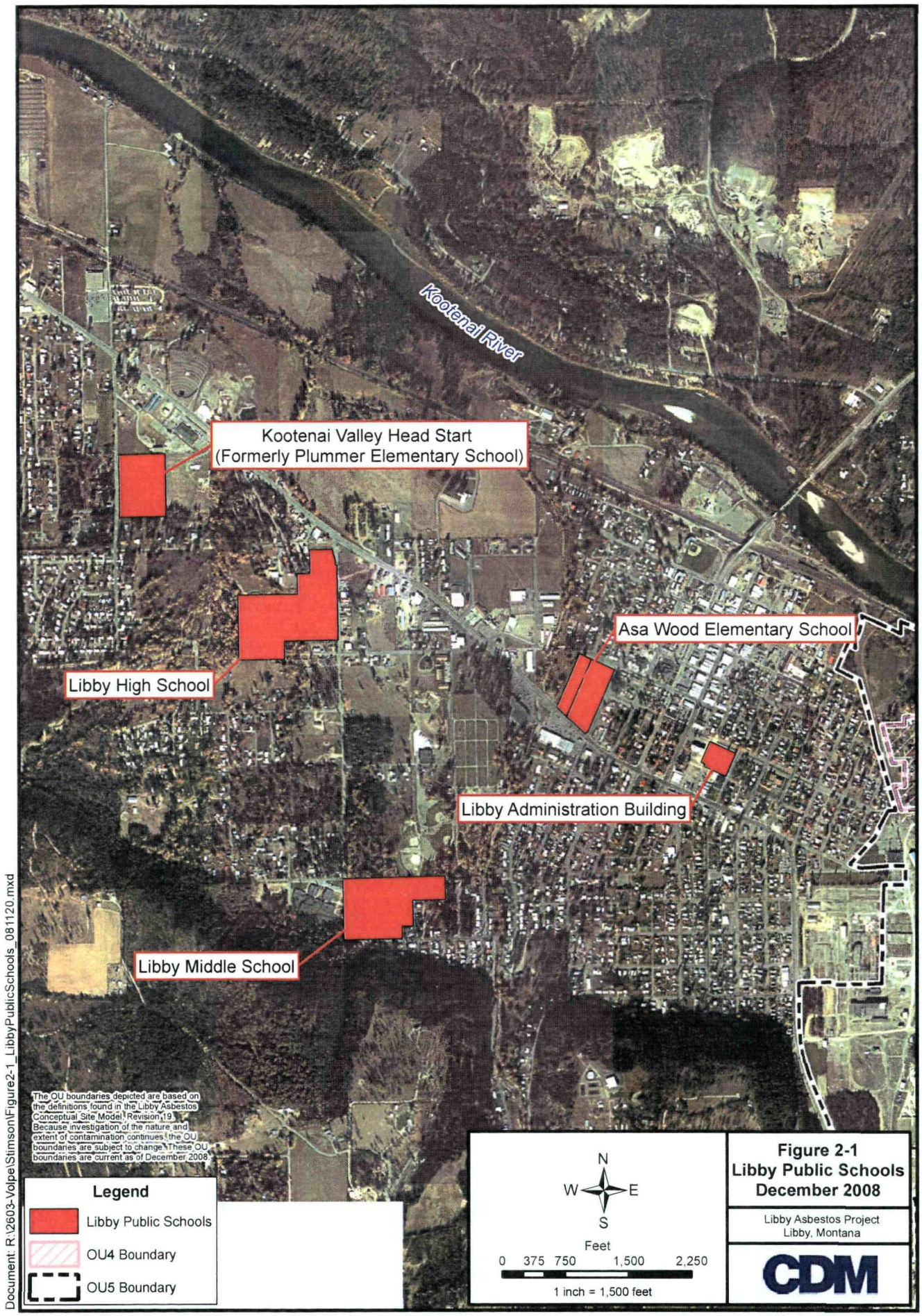
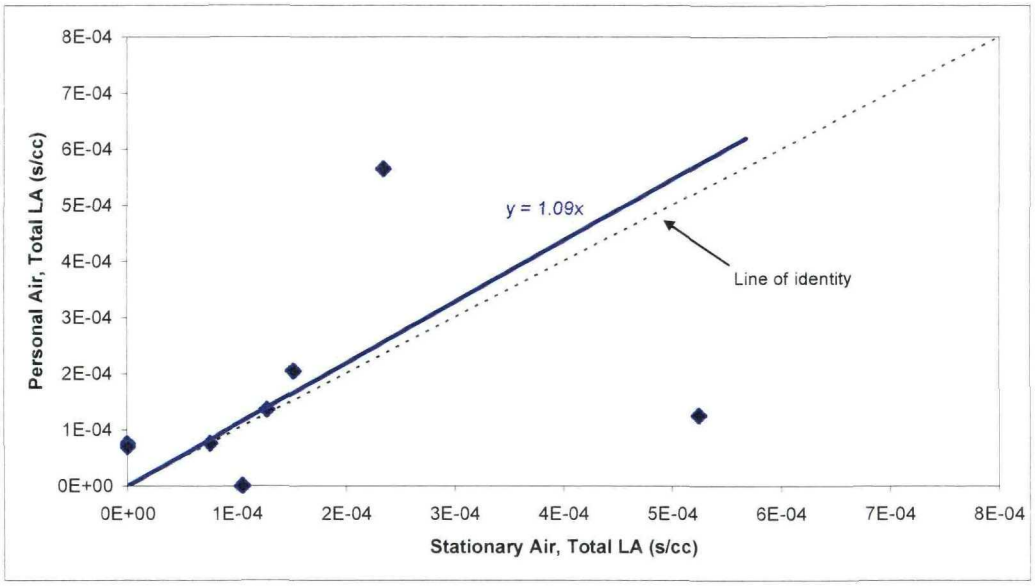

Kootenai River
Kootenai Valley Head Start
(Formerly Plummer Elementary School)
Libby High School
Asa Wood Elementary School
Libby Administration Building
Libby Middle School
The OU boundaries depicted are based on the definitions found in the Libby Asbestos Conceptual Site Model Revision 19. Because investigation of the nature and extent of contamination continues, the OU boundaries are subject to change. These OU boundaries are current as of December 2008.
Legend
Libby Public Schools
OU4 Boundary
OU5 Boundary
N
W
E
S
Feet
0 375 750 1,500 2,250
1 inch = 1,500 feet
Figure 2-1
Libby Public Schools
December 2008
Libby Asbestos Project
Libby, Montana
CDM
Document: R:\2603-Volpe\Stimson\Figure2-1_LibbyPublicSchools_081120.mxd

FIGURE 3-1
COMPARISON OF PERSONAL AND STATIONARY AIR SAMPLES FROM TWO STUDIES IN LIBBY

Panel A: Data from the Phase II Investigation



Panel B: Data from the SQAPP Investigation

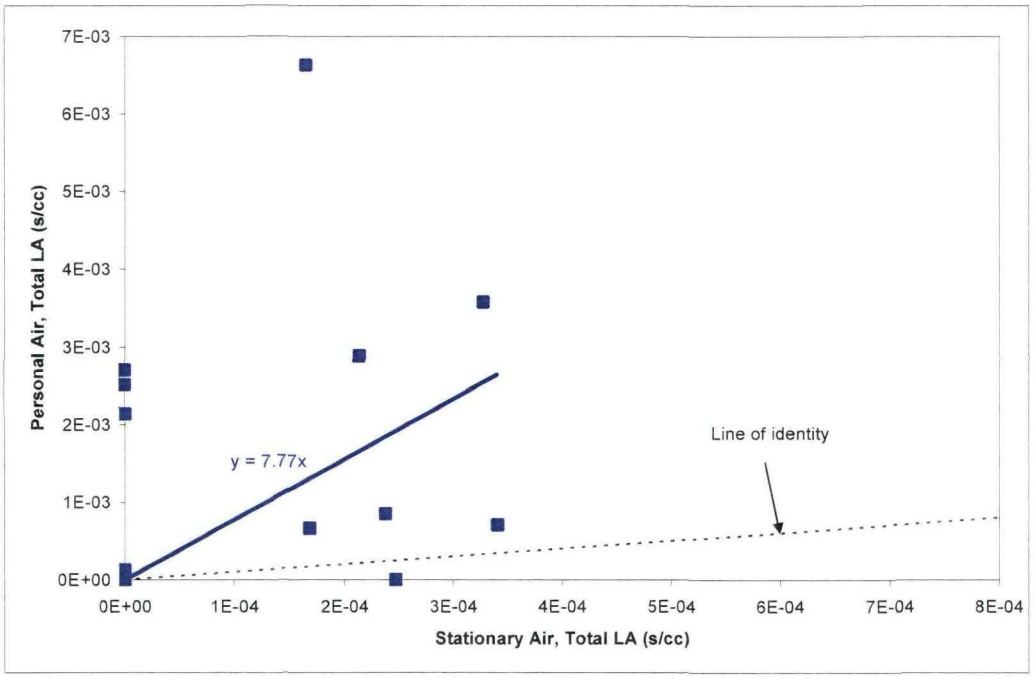
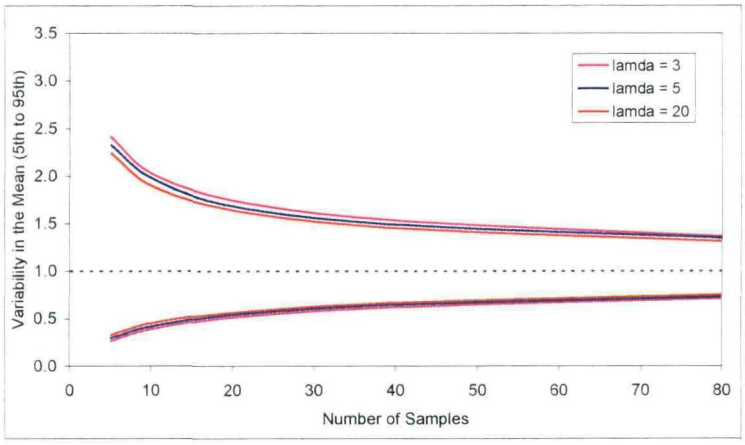


FIGURE 3-2
EFFECT OF SAMPLE SIZE ON UNCERTAINTY IN THE MEAN

GSD = 3



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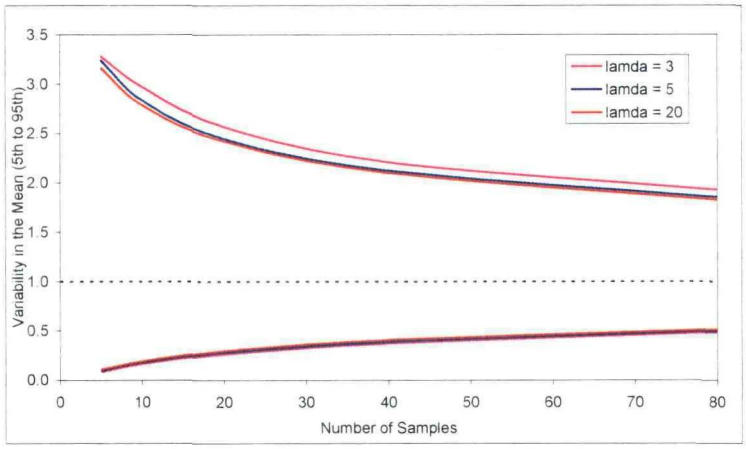

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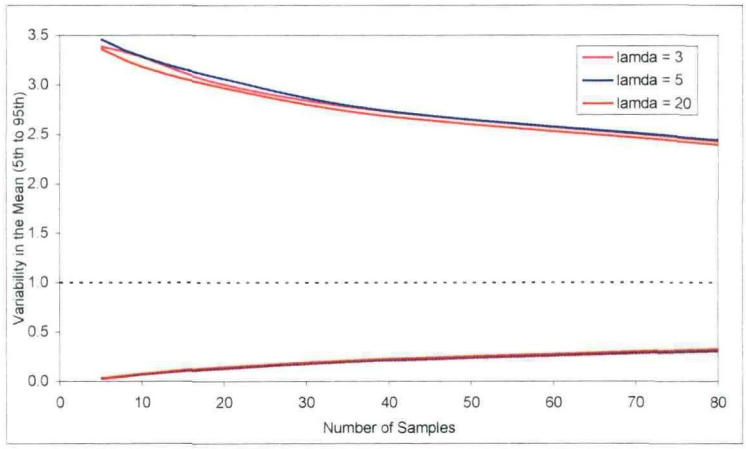

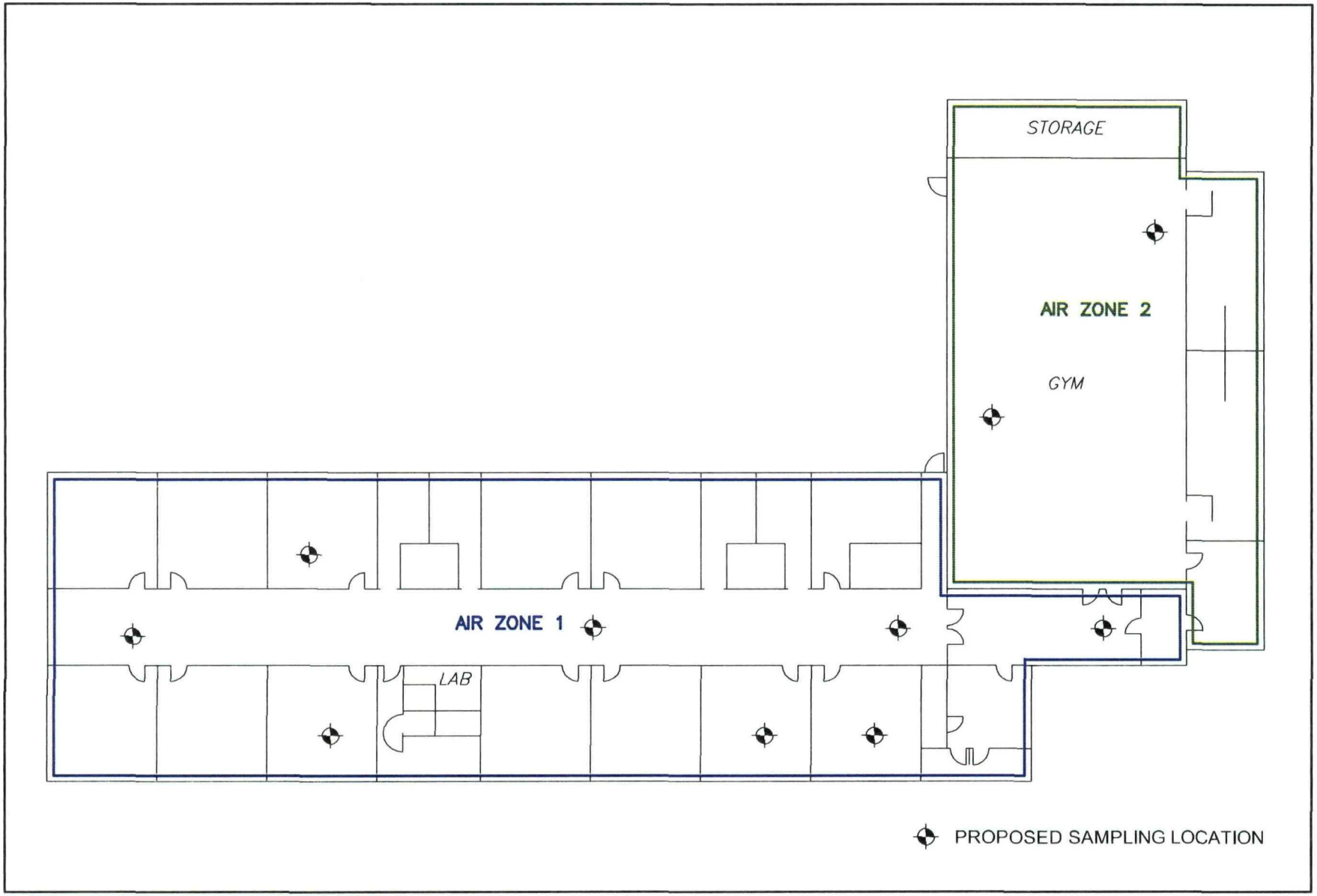

Figure No. 4-1
Kootenai Valley Head Start
Floor Plan and Sampling Locations

CDM

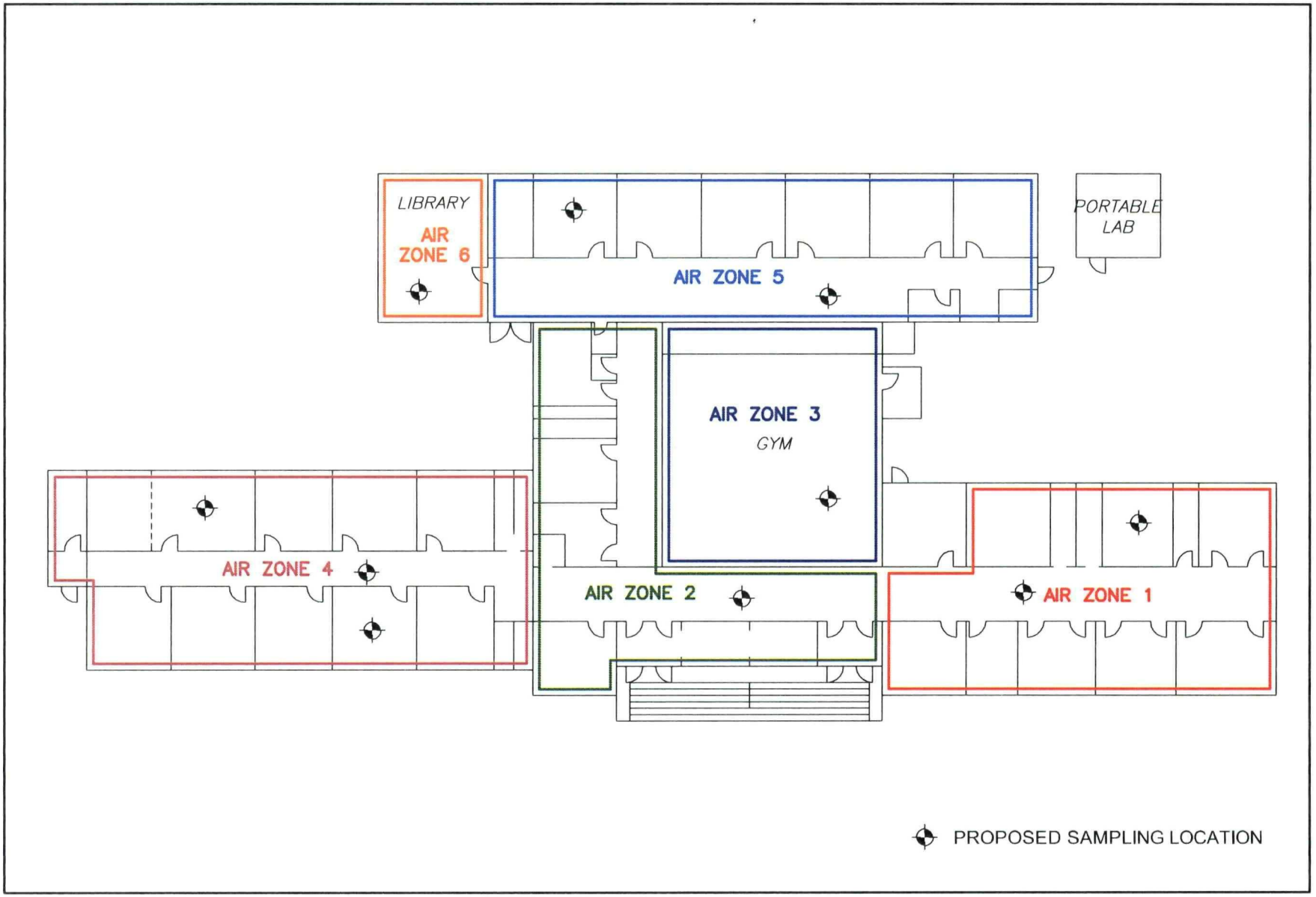

Figure No. 4-2
Asa Wood Elementary School
Floor Plan and Sampling Locations

CDM

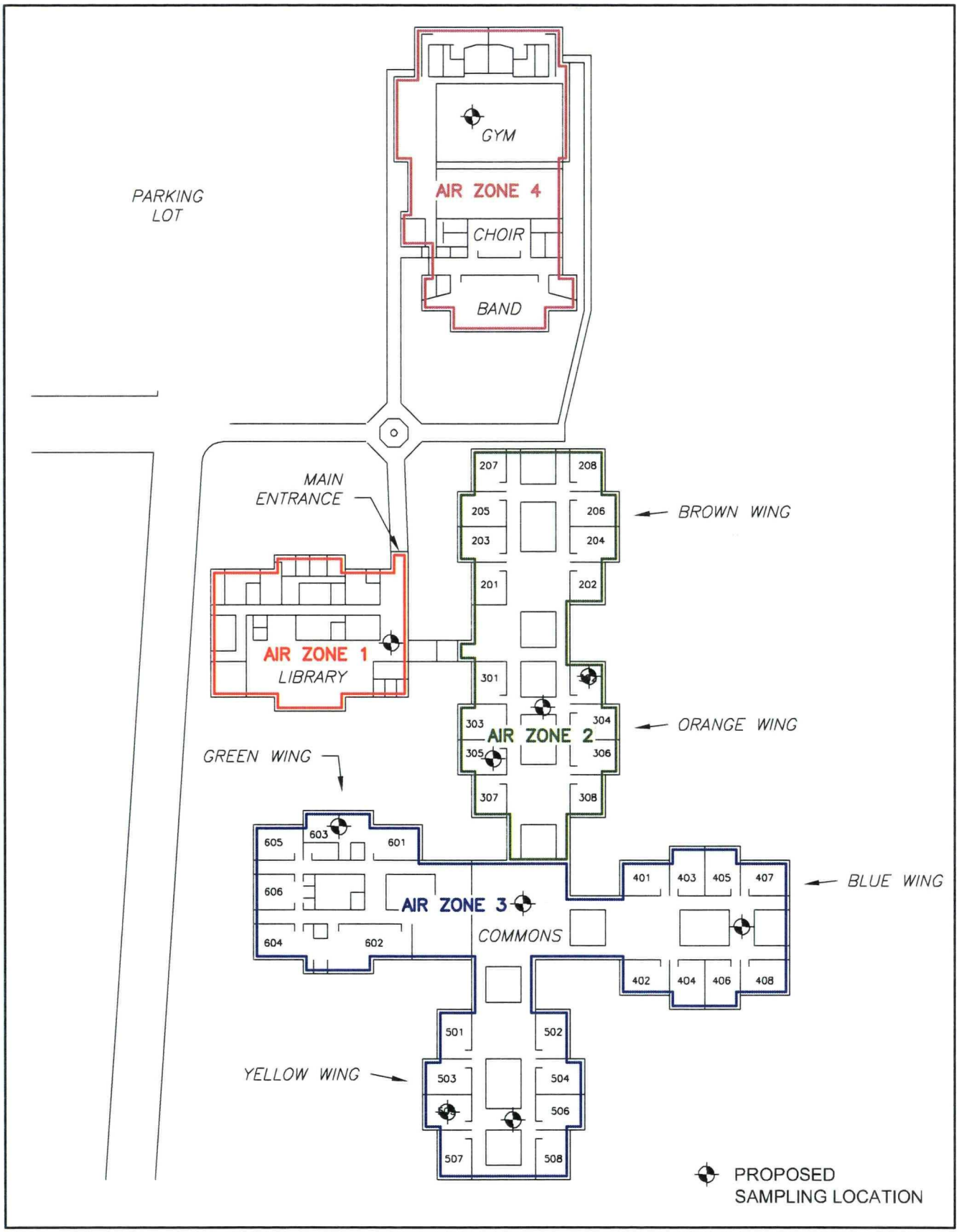

Figure No. 4-3
Libby Middle School
Floor Plan and Sampling Locations

CDM

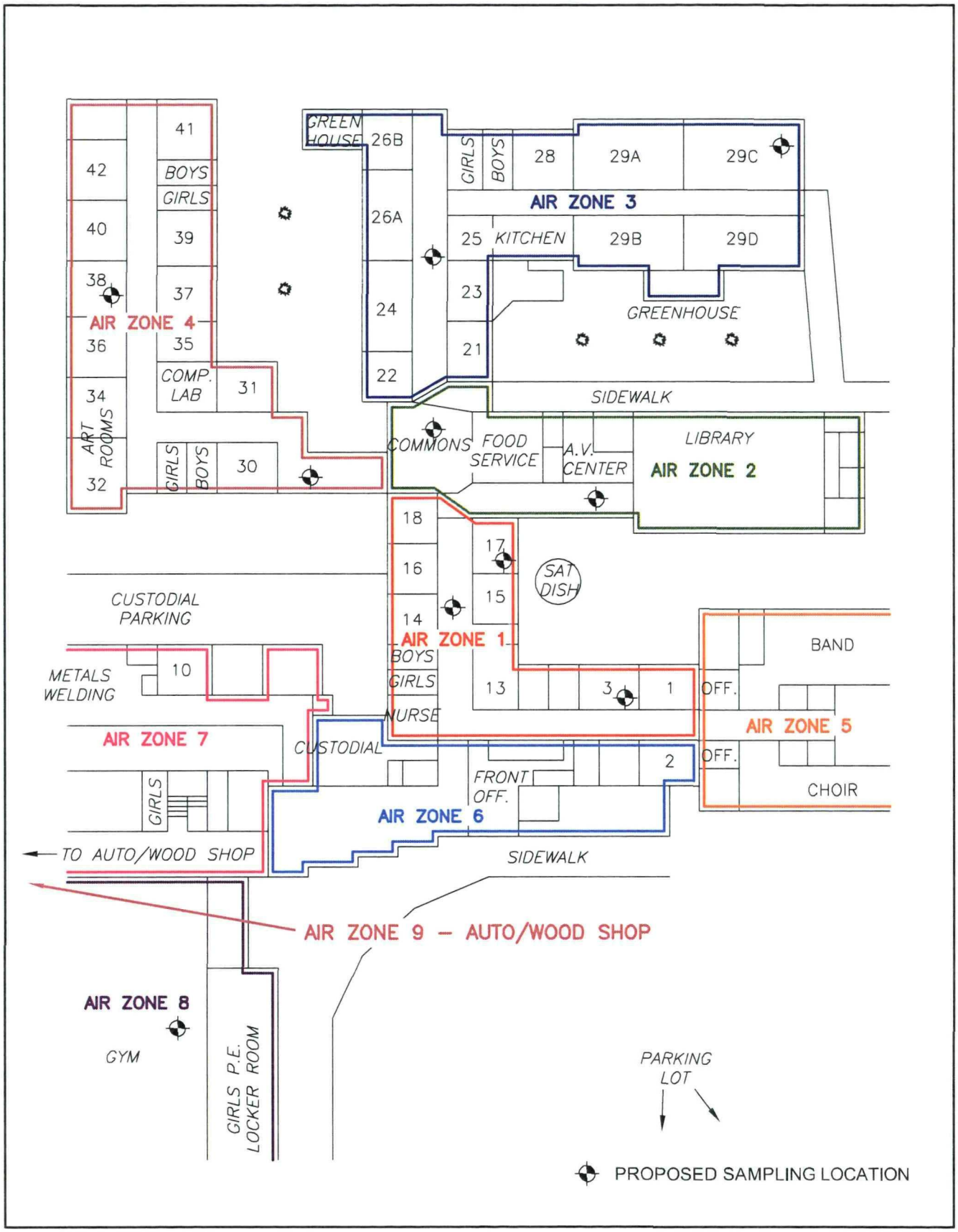

Figure No. 4-4
Libby High School
Floor Plan and Sampling Locations

CDM

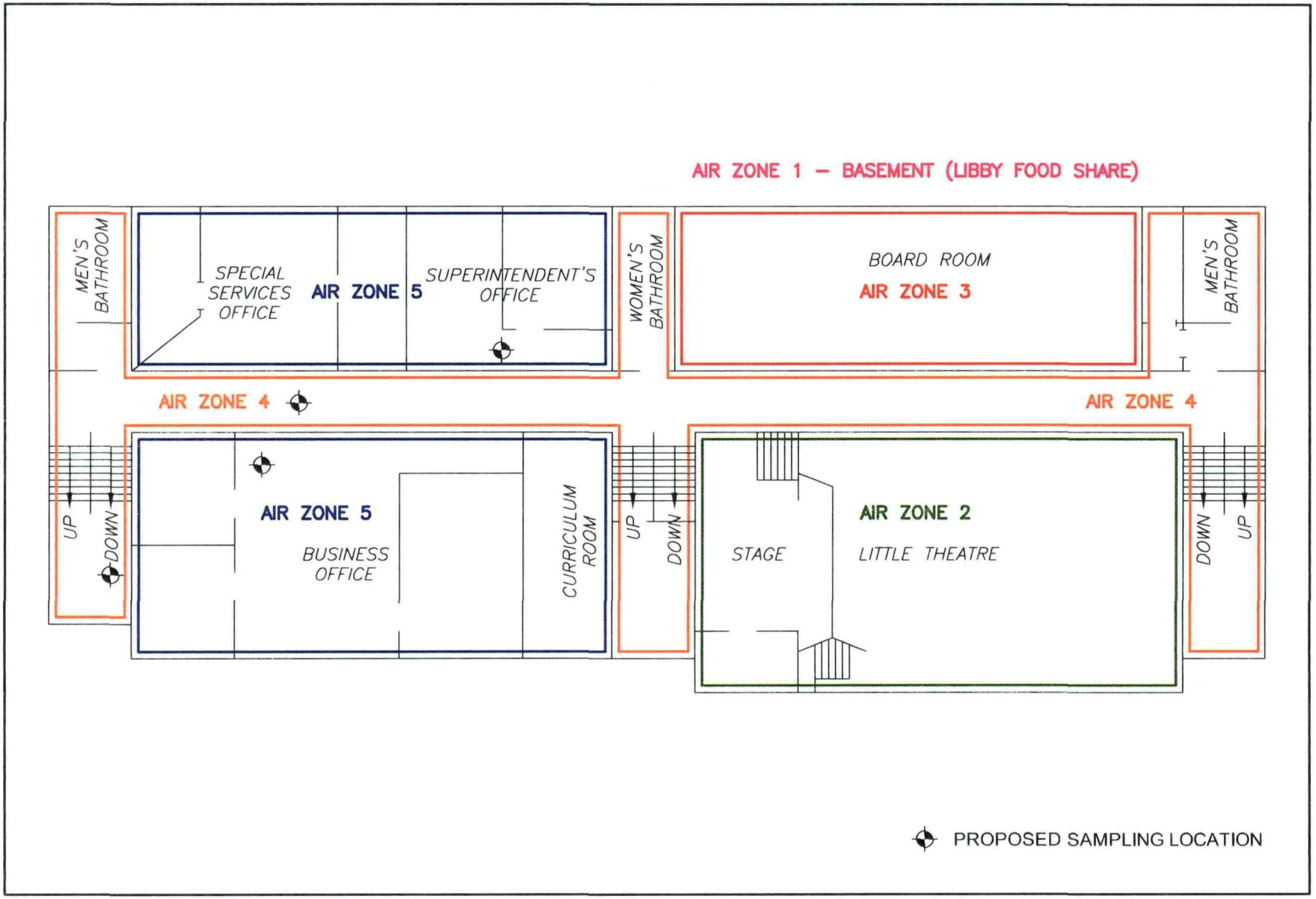

Figure No. 4-5
Libby Administration Building
Ground Floor Plan and Sampling Locations

CDM

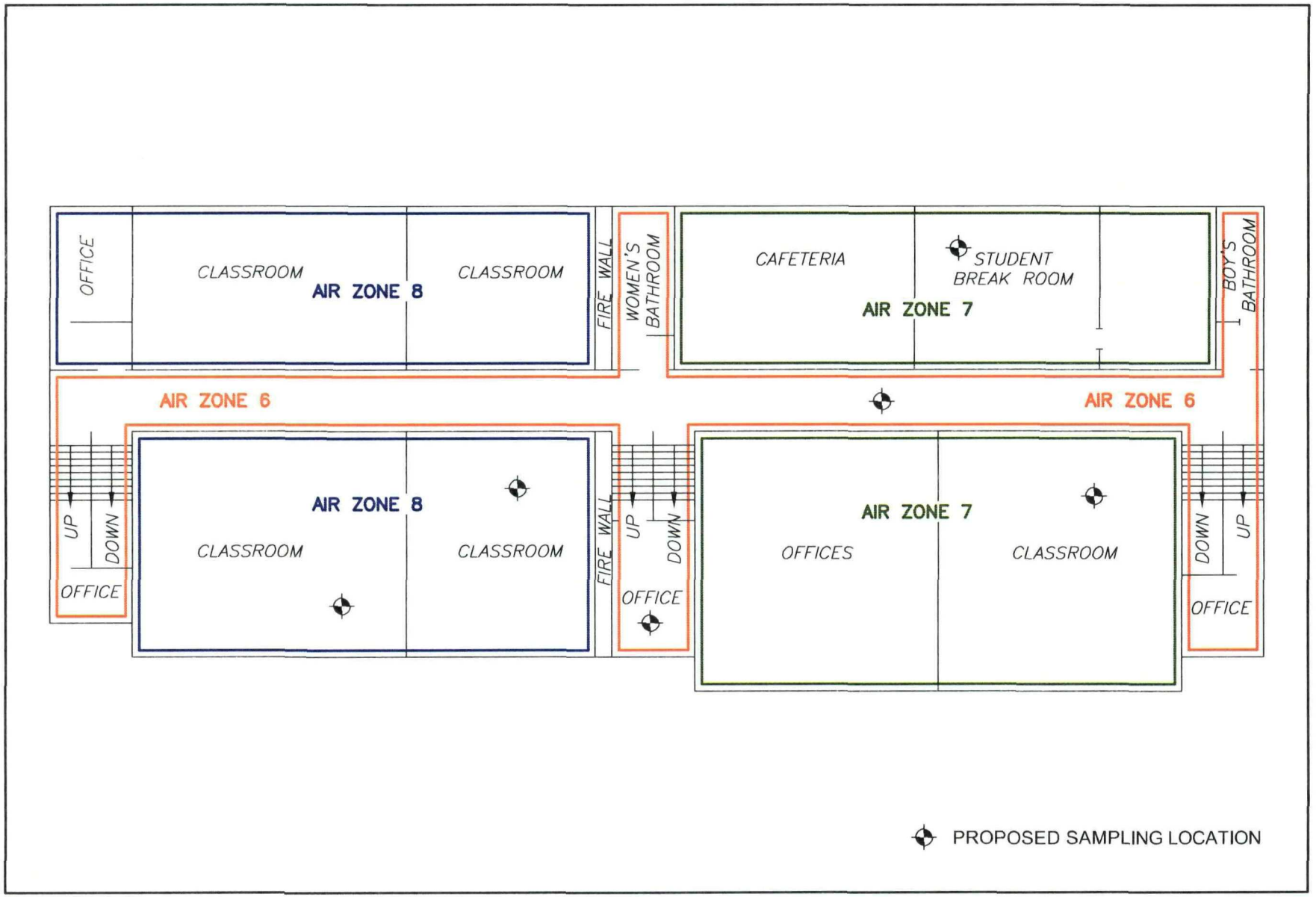

Figure No. 4-6
Libby Administration Building
Second Floor Plan and Sampling Locations

CDM

Table 2-1 Analytical Results for Indoor Air and Dust Samples; 2000-2003

Property Group (Location)	Sample ID	Sample Date	Media Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Field Comments	SSN (last 4 digits)	Scenario	Task	Pre Post Clear	Vol (Air=L) or Area (Dust=cm²)	ISO Concentration (Air=Structures/cc)/(Dust=Structures/cm²) (Method - ISO 10312)																							
															Libby Amphibole (LA)										Chrysotile (C)								Other Amphibole (OA)					
															Excluded Structures			Structures Detected					Excluded Structures			Structures Detected					Excluded Structures			Structures Detected				
															Grid Openings	Filter Status Non Analyzed	Aspect Ratio < 5:1	Length < 0,5 u	Diameter > 0,5u	Length 0,5 to 5 u	Length 5 to 10 u	Length > 10 u	Total Conc. LA	Total Count LA	Aspect Ratio < 5:1	Length < 0,5 u	Diameter > 0,5u	Length 0,5 to 5 u	Length 5 to 10 u	Length > 10 u	Total Conc. C	Total Count C	Aspect Ratio < 5:1	Length < 0,5 u	Diameter > 0,5u	Length 0,5 to 5 u	Length 5 to 10 u	Length > 10 u	Total Conc. OA	Total Count OA
Libby Middle School																																					
101 Ski Rd	28-28726	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	Hallway by room 115	4.140		N/A		N/A	4140	10			0				0	0						0	0								0	0
101 Ski Rd	28-28726	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	Hallway by room 115	4.140		N/A		N/A	4140	10			0				0	0						0	0						0	0
101 Ski Rd	28-28727	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	Hallway by room 301	4.140		N/A		N/A	4140	10			0				0	0						0	0						0	0
101 Ski Rd	28-28728	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	Hallway by room 409	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
101 Ski Rd	28-28729	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	Hallway by room 510	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
101 Ski Rd	28-28730	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	Hallway by room 613	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
101 Ski Rd	28-28731	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	Hallway near music hal	4.200		N/A		N/A	4200	10			0				0	0						0	0						0	0
101 Ski Rd	28-28732	1/23/2000	Air	Indoor	Field Sample	AD-000198	School	GYM. Near clock on wall	4.200		N/A		N/A	4200	10			0				0	0						0	0						0	0
101 Ski Rd	VC-00117	1/23/2000	Dust	Indoor	Field Sample	AD-000198	School	Room 115. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	4,317	0	0	4,317	4	0	0	0	0	0	0	0
101 Ski Rd	VC-00118	1/23/2000	Dust	Indoor	Field Sample	AD-000198	School	Room 408. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	32	32	1	0	0	0	0	0	0	0
101 Ski Rd	VC-00119	1/23/2000	Dust	Indoor	Field Sample	AD-000198	School	Room 510. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101 Ski Rd	VC-00120	1/23/2000	Dust	Indoor	Field Sample	AD-000198	School	3 Windowsills between 202 and 302 (across from gui			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101 Ski Rd	VC-00121	1/23/2000	Dust	Indoor	Field Sample	AD-000198	School	Room 402. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	41,008	3,238	0	44,246	41	0	0	0	0	0	0
101 Ski Rd	VC-00122	1/23/2000	Dust	Indoor	Field Sample	AD-000198	School	Entrance to gym. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	49,642	2,158	1,079	52,879	49	0	0	0	0	0	0
101 Ski Rd	VC-00123	1/23/2000	Dust	Indoor	Field Sample	AD-000198	School	South end of auditorium hall. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libby High School																																					
150 Education Way	28-28715	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	Room 10			N/A		N/A	4320	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	28-28716	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	Hallway room 3	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
150 Education Way	28-28717	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	Hallway at front office	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
150 Education Way	28-28718	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	Hallway at room 17	3.780		N/A		N/A	3780	10			0				0	0						0	0						0	0
150 Education Way	28-28719	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	Hallway at room 24	3.960		N/A		N/A	3960	10			0				0	0						0	0						0	0
150 Education Way	28-28720	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	HALLWAY AT ROOM 32	4.140		N/A		N/A	4140	10			0				0	0						0	0						0	0
150 Education Way	28-28721	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	HALLWAY AT ROOM 40	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
150 Education Way	28-28722	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	HALLWAY AT ROOM 31	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
150 Education Way	28-28723	1/22/2000	Air	Indoor	Field Sample	AD-000192	School	HALLWAY AT GYM	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
150 Education Way	28-28733	1/23/2000	Air	Indoor	Field Sample	AD-000192	School	Boiler room	4.440		N/A		N/A	4440	10			0				0	0						0	0						0	0
150 Education Way	28-28733	1/23/2000	Air	Indoor	Field Sample	AD-000192	School	Boiler room	4.440		N/A		N/A	4440	10			0				0	0						0	0						0	0
150 Education Way	VC-00105	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Room 2, separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	VC-00106	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Boiler room. 3 stair treads			N/A		N/A	300	10		0	0	0	322	0	0	322	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	VC-00107	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Room 22. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	VC-00108	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Drafting room, 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	322	0	0	322	1	0	0	0	0	0	0
150 Education Way	VC-00109	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Room 17. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	16,188	0	0	16,188	3	0	0	0	0	0	0
150 Education Way	VC-00110	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Main entrance lobby. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	VC-00111	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Room 32. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	10,792	5,396	0	16,188	3	0	0	0	0	0	0
150 Education Way	VC-00112	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Room 40. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	VC-00113	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	Room 31. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	VC-00114	1/22/2000	Dust	Indoor	Field Sample	AD-000192	School	North end of hallway leading to gym. 3 windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	1-02735	6/18/2001	Dust	Building	Field Sample	AD-000192	Storage Building	Football field storage building-west	Floor (concrete). At entrance (100 cm^2). Middle of room (100 cm^2). West wall (100 cm^2)		N/A		N/A	300	10		0	0	0	42,459	0	0	42,459	3	0	0	0	84,918	14,153	14,153	113,224	8	0	0	0	0	0	0
150 Education Way	1-02736	6/18/2001	Dust	Building	Field Sample	AD-000192	Storage Building	Football field storage building-east	Floor (concrete). At entrance (100 cm^2). East wall on top of base plate (100 cm^2). Southwall (100 cm^2)		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	1-03480	8/14/2001	Dust	Building	Field Sample	AD-000192	Storage Building	Visitor's side coach's box	1) Floor-100cm2. 2) Right side shelf-100cm2. 3) Left side shelf-100cm2		N/A		N/A	300	10		1,132	0	0	4,529	566	0	6,227	11	0	0	0	566	0	1,132	1,698	3	0	0	0	0	0	0	0
150 Education Way	1-03481	8/14/2001	Dust	Building	Field Sample	AD-000192	Storage Building	Visitor's side storage garage	1) Floor near entrance-100cm2. 2) Top of wood box- 100cm2. 3) Pole vault pit top-100cm2		N/A		N/A	300	9		0	0	1,258	2,516	2,516	0	6,290	5	0	0	1,258	20,129	6,290	1,258	28,935	23	0	0	0	0	0	0	0
150 Education Way	1-03482	8/14/2001	Dust	Building	Field Sample	AD-000192	Property	Home side press box	1) Floor near entrance-100cm2. 2) Left side table-100cm2. 3) Floor 2nd level-100cm2		N/A		N/A	300	4		0	0	2,831	5,661	0	0	8,492	3	0	0	0	50,951	5,661	5,661	62,273	22	0	0	0	0	0	0	0
150 Education Way	1-03484	8/14/2001	Dust	Building	Field Sample	AD-000192	School	Snack bar	1) Floor by door-100cm2. 2) Right counter-100cm2. 3) Counter near popcorn machine-100cm2		N/A		N/A	300	10		0	0	0	1,132	0	0	1,132	1	0	0	0	2,264	1,132	0	3,397	3	0	0	0	0	0	0	0
150 Education Way	1-03858	9/19/2001	Dust	Unknown	Field Sample	AD-000192	Bleachers	Home side bleachers	100cm2 top of bleacher on foot rest. 10th step. 100cm2 - midway up bleacher on foot rest. 5th step. 100cm2- bottom of bleacher. 1st step/walkway		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 Education Way	1-03859	9/19/2001	Dust	Unknown	Field Sample	AD-000192	Bleachers	Visitor side bleachers	100cm2 Top of bleacher on foot rest- 10th step. 100cm2- Midway up bleacher on foot rest. 5th step. 100cm2- Bottom of bleacher on 1st step/walkway		N/A		N/A	300	10		0	0	2,831	0	0	0	2,831	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kootenai Valley Head Start																																					
247 Indian Head Rd	28-28711	1/22/2000	Air	Indoor	Field Sample	AD-000205	School	GYM. Right wall	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
247 Indian Head Rd	28-28712	1/22/2000	Air	Indoor	Field Sample	AD-000205	School	KIFER Office hallway	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
247 Indian Head Rd	28-28713	1/22/2000	Air	Indoor	Field Sample	AD-000205	School	Custodians office	4.410		N/A		N/A	4410	10			0				0	0						0.7938	1						0	0
247 Indian Head Rd	28-28714	1/22/2000	Air	Indoor	Field Sample	AD-000205	School	Turman office hallway	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
247 Indian Head Rd	VC-00101	1/22/2000	Dust	Indoor	Field Sample	AD-000205	School	Janitor's room. 2 shelves. 1 desktop			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	1,160	515	161	1,836	57	0	0	0	0	0	0
247 Indian Head Rd	VC-00102	1/22/2000	Dust	Indoor	Field Sample	AD-000205	School	Gym. bookshelves. 3 sample siter			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
247 Indian Head Rd	VC-00103	1/22/2000	Dust	Indoor	Field Sample	AD-000205	School	Room 11. 1 sill. 2 countertops by window			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
247 Indian Head Rd	VC-00104	1/22/2000	Dust	Indoor	Field Sample	AD-000205	School	Room 8. 3 separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Asa Wood Elementary School																																					
700 Idaho Ave	28-28705	1/22/2000	Air	Indoor	Field Sample	AD-000621	School	HALLWAY. ROOM 6	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
700 Idaho Ave	28-28706	1/22/2000	Air	Indoor	Field Sample	AD-000621	School	CENTER OF THE BOILER ROOM	3.780		N/A		N/A	3780	10			0				0	0						0	0						0	0
700 Idaho Ave	28-28707	1/22/2000	Air	Indoor	Field Sample	AD-000621	School	FRONT ENTRANCE HALLWAY BY OFFICE	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
700 Idaho Ave	28-28708	1/22/2000	Air	Indoor	Field Sample	AD-000621	School	GYM STAGE	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
700 Idaho Ave	28-28709	1/22/2000	Air	Indoor	Field Sample	AD-000621	School	HALLWAY ROOM 19	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
700 Idaho Ave	28-28710	1/22/2000	Air	Indoor	Field Sample	AD-000621	School	Hallway room 27	4.320		N/A		N/A	4320	10			0				0	0						0	0						0	0
700 Idaho Ave	VC-00095	1/22/2000	Dust	Indoor	Field Sample	AD-000621	School	Boiler room. top of electrical box			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	3,221	0	3,221	1	0	0	0	0	0	0
700 Idaho Ave	VC-00096	1/22/2000	Dust	Indoor	Field Sample	AD-000621	School	Stage -3 areas - front stage			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700 Idaho Ave	VC-00097	1/22/2000	Dust	Indoor	Field Sample	AD-000621	School	Room 6 -3 separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700 Idaho Ave	VC-00098	1/22/2000	Dust	Indoor	Field Sample	AD-000621	School	Music room. separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	43,167	0	0	43,167	8	0	0	0	0	0	0
700 Idaho Ave	VC-00099	1/22/2000	Dust	Indoor	Field Sample	AD-000621	School	Room 16. separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
700 Idaho Ave	VC-00100	1/22/2000	Dust	Indoor	Field Sample	AD-000621	School	Entrance. office ledge inside doors and sills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libby Administration Building																																					
724 Louisiana Ave	28-28694	1/21/2000	Air	Indoor	Field Sample	AD-000195	Property	HALLWAY ACROSS FORM BUSINESS OFFICE. GROUND FLOOR			N/A		N/A	4500	10			0				0	0						0	0						0	0
724 Louisiana Ave	28-28695	1/21/2000	Air	Indoor	Field Sample	AD-000195	Property	YMCA. VISTA office. Main floor. Room 9 by soda mac			N/A		N/A	4140	15			0				0	0						1.1274	2						0	0
724 Louisiana Ave	28-28696	1/21/2000	Air	Indoor	Field Sample	AD-000195	Property	2ND FLOOR HALLWAY. LEFT OF ROOM 7			N/A		N/A	4320	10			0				0.0008	1						1.6211	2						0	0
724 Louisiana Ave	28-28697	1/21/2000	Air	Indoor	Field Sample	AD-000195	Property	2ND FLOOR HALLWAY. ACROSS FROM ROOM 14			N/A		N/A	4140	10			0				0	0						0	0						0	0

Table 2-1 Analytical Results for Indoor Air and Dust Samples; 2000-2003

Property Group (Location)	Sample ID	Sample Date	Media Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Field Comments	SSN (last 4 digits)	Scenario	Task	Pre Post Clear	Vol (Air=L) or Area (Dust=cm²)	ISO Concentration (Air=Structures/cc)/(Dust=Structures/cm²) (Method - ISO 10312)																											
															Libby Amphibole (LA)										Chrysotile (C)										Other Amphibole (OA)					
															Grid Openings	Filter Status Non Analyzed	Excluded Structures			Structures Detected			Total Conc. LA	Total Count LA	Excluded Structures			Structures Detected			Total Conc. C	Total Count C	Excluded Structures			Structures Detected			Total Conc. OA	Total Count OA
																	Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u			Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u			Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u		
724 Louisiana Ave	28-28698	1/21/2000	Air	Indoor	Field Sample	AD-000195	Property	BASEMENT HALLWAY			N/A		N/A	4320	10			0				0	0		0				0	0		0					0	0
724 Louisiana Ave	VC-00084	1/21/2000	Dust	Indoor	Field Sample	AD-000195	Property	Board of trustees room; 3 separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	VC-00085	1/21/2000	Dust	Indoor	Field Sample	AD-000195	Property	Business Office; 3 separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	225	32	0	258	8	0	0	0	0	0	0	0	0
724 Louisiana Ave	VC-00086	1/21/2000	Dust	Indoor	Field Sample	AD-000195	Property	Comm. Interagencies office; 3 separate windowsills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	258	129	0	387	12	0	0	0	0	0	0	0	0
724 Louisiana Ave	VC-00087	1/21/2000	Dust	Indoor	Field Sample	AD-000195	Property	South end of hallway; 3 separate sills			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	644	0	0	644	20	0	0	0	0	0	0	0	0
724 Louisiana Ave	VC-00088	1/21/2000	Dust	Indoor	Field Sample	AD-000195	Property	Electrical closet Northwest end of bldg Basement			N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	64	0	419	64	0	548	17	0	0	0	32	0	32	1
724 Louisiana Ave	1-03151	6/28/2001	Dust	Building	Field Sample	AD-000195	Property	Lincoln County School Admin building - old	100cm2 top step of stairs 2nd floor north end; 100cm2 - window ledge of northwest corner mens bathroom; 100cm2 - north window ledge of electronics room northeast		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1-03152	6/28/2001	Dust	Building	Field Sample	AD-000195	Property	Lincoln County School Admin building - New	100cm2 top step of stairs 2nd floor south; 100 cm2 - window ledge of room 13 south; 100cm2 - top of air handling equipment adjacent to rm 13 hallway door		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00043	4/9/2003	Dust	Building	Field Sample	BD-003239	Ground Level	High traffic walkways north end	100cm2 North entrance; 100cm2 Middle entrance; 100cm2 Between middle and N. entrance hallway		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00044	4/9/2003	Dust	Building	Field Sample	BD-003239	Ground Level	Horizontal surfaces north end	100cm2 N window sill; 100cm2 East radiator; 100cm2 West radiator		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00045	4/9/2003	Dust	Building	Field Sample	BD-003239	Ground Level	High traffic walkways south end	100cm2 S entrance; 100cm2 Middle stair to next level; 100cm2 In between S & middle		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00046	4/9/2003	Dust	Building	Field Sample	BD-003239	Ground Level	Horizontal surfaces south end	100cm2 Buisness office; 100cm2 Admain offic; 100cm2 Men bathroom south		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00047	4/9/2003	Dust	Building	Field Sample	BD-003239	Basement	High traffic walkways (Basement is in N section of | building); 100cm2 Bottom of stairs; 100cm2 Entry way to food puntry; 100cm2 Boiler room entry		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00048	4/9/2003	Dust	Building	Field Sample	BD-003239	Basement	Horizontal surfaces	100cm2 Counter top next to sink; 100cm2 Boiler room window sill; 100cm2 Top of cabinet doors in hallway outside puntry		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00049	4/9/2003	Dust	Building	Field Sample	BD-003239	2nd Level	High traffic walkways north hall	100cm2 N entrance; 100cm2 Middle entrance; 100cm2 Middle of N and Middle		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00050	4/9/2003	Dust	Building	Field Sample	BD-003239	2nd Level	Horizontal surfaces north end	100cm2 Room 8 wall lodge; 100cm2 N mens bathroom window sill; 100cm2 Room 10 banesfer		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00051	4/9/2003	Dust	Building	Field Sample	BD-003239	2nd Level	High traffic walkways south end	100cm2 Middle stairs; 100cm2 S stairs; 100cm2 Middle hall		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00052	4/9/2003	Dust	Building	Field Sample	BD-003239	2nd Level	Horizontal surfaces south end	100cm2 Room 12 window sill; 100cm2 Room 13 window sill; 100cm2 Room 14 window sill		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00547	6/23/2003	Dust	Horizontal Surface	Field Sample	BD-003239	School	Attic (s)	100cm2 SE portion of S attic (on joists); 100cm2 (above); 100cm2 (above)		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00548	6/23/2003	Dust	Horizontal Surface	Field Sample	BD-003239	School	Attic (S)	100cm2 W portion of S attic (on joists); 100cm2 (above); 100cm2 (above)		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
724 Louisiana Ave	1D-00549	6/23/2003	Dust	Horizontal Surface	Field Sample	BD-003239	School	Attic (S)	100cm2 E portion of S attic (on joists); 100cm2 (above); 100cm2 (above)		N/A		N/A	300	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2-2 Analytical Results for Indoor Soil Samples Collected at Kootenai Valley Head Start; 2008

Property Group (Location)	Sample ID	Sample Date	Field Sample Data Sheet Number	Logbook Number	Media Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Type (Grab or Composite)	Number of Subsamples	Sample Top Depth (inches below ground surface)	Sample Bottom Depth (inches below ground surface)	Field Comments	PLM			
																Method	LA Bin	LA (%)	C (%)
247 Indian Head Rd	1D-11280-B	9/10/2008	S-005986	101043	Soil-Like	Surface Soil	Field Sample	BD-005584	Play Area	Classroom sandbox in playroom	Grab	0	0	3	BD-005584; Visible vermiculite	PLM-9002	A	ND	ND
247 Indian Head Rd	1D-11281-B	9/10/2008	S-005986	101043	Soil-Like	Surface Soil	Field Sample	BD-005584	Stockpile	5 gal bucket in gym storeroom	Grab	0	0	3	BD-005584; Visible vermiculite	PLM-9002	A	ND	ND
247 Indian Head Rd	1D-11282-B	9/10/2008	S-005986	101043	Soil-Like	Surface Soil	Field Sample	BD-005584	Stockpile	5 gal bucket in gym storeroom	Grab	0	0	3	BD-005584; Visible vermiculite	PLM-9002	A	ND	ND
247 Indian Head Rd	1D-11283-B	9/10/2008	S-005987	101043	Soil-Like	Surface Soil	Field Sample	BD-005584	Stockpile	Parents room 5 gal bucket storeroom	Grab	0	0	3	BD-005584; No visible	PLM-9002	A	ND	ND

Table 2-3 Analytical Results for Bulk Samples Collected at Libby High School and Libby Administration Building; 2001

Property Group (Location)	Sample ID	Sample Date	Media Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Field Comments	PLM (Method - NIOSH 9002)			
										LA (%)		C (%)	
150 Education Way	1-04257	10/25/2001	Bulk	Dryer lint	Field Sample	AD-000192	School	Dryer serial # KC-229131-KA; From dryer lint trap		ND		ND	
150 Education Way	1-04258	10/25/2001	Bulk	Dryer lint	Field Sample	AD-000192	Property	Dryer serial # 1031; From dryer lint trap		ND		ND	
150 Education Way	1-04259	10/25/2001	Bulk	N/A	Field Sample	AD-000192	School	Dryer serial # 3224384; From dryer lint trap		ND		ND	
150 Education Way	1-04260	10/25/2001	Bulk	Insulation	Field Sample	AD-000192	School	Dryer serial # 3223-384; From dryer lint trap	WR grace tag on front face, tag # 8712350356	ND		ND	
724 Louisiana Ave	1-03031	6/22/2001	Bulk	Insulation	Field Sample	AD-000195	Property	2nd floor, Rm 9 on top of light fixture	Discharge from hole cut by electrians conducting remodeling	ND		ND	
724 Louisiana Ave	1-03032	6/22/2001	Bulk	Insulation	Field Sample	AD-000195	Property	Rm 9 on top of the desk adjancent window	2nd floor; Discharge from hole cut by electrians conducting remodeling	<	1	ND	
724 Louisiana Ave	1-03033	6/22/2001	Bulk	Insulation	Field Sample	AD-000195	Property	Rm 9 above desk adjacent window	2nd floor, on top of light fixture; Discharge from hole cut by electrians conducting remodeling	ND		ND	
724 Louisiana Ave	1-03155	6/28/2001	Bulk	Vermiculite	Field Sample	AD-000195	Property	Attic - old section south-southeast corner		ND		ND	
724 Louisiana Ave	1-03156	6/28/2001	Bulk	Vermiculite	Field Sample	AD-000195	Property	Attic - old section south of access		ND		ND	
724 Louisiana Ave	1-03157	6/28/2001	Bulk	Vermiculite	Field Sample	AD-000195	Property	Attic - old section north-northwest corner		ND		ND	
724 Louisiana Ave	1-03158	6/28/2001	Bulk	Vermiculite	Field Sample	AD-000195	Property	Attic - old secton west of attic access		<	1	ND	

TABLE 4-1 SUMMARY OF FIELD QC SAMPLES

Sample Type	Minimum Collection Frequency		Minimum Analysis Frequency	Acceptance Criteria	Acceptance Criteria Failure Action
Lot Blank	1 per 500 cassettes	0.2%	100%	ND for all asbestos	Rejection of all cassettes in lot
Field Blank	1 per property per day		10% of total collected per week	ND for all asbestos fibers	Analysis of additional field blanks to determine source of potential cross-contamination, qualification of sample results, evaluation of field sample handling procedures

Notes:
QC = quality control
ND = non-detect

APPENDIX A
2000 AND 2008 LIBBY PUBLIC SCHOOLS
INSPECTION SUMMARIES

FINAL

REVIEW OF ASBESTOS SURVEYS AND VISUAL INSPECTION
LIBBY PUBLIC SCHOOLS, LIBBY, MONTANA

Prepared For:

Mr. Timothy B. Wall
New England Manager
CDM Federal Programs Corporation
One Cambridge Place
50 Hampshire Street
Cambridge, MA 02139

March 2000

Prepared By:

PACIFIC ENVIRONMENTAL SERVICES, INC.
560 Herndon Parkway, Suite 200
Herndon, VA 20170

FINAL

REVIEW OF ASBESTOS SURVEYS AND VISUAL INSPECTION LIBBY PUBLIC SCHOOLS, LIBBY, MONTANA

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

1.0 INTRODUCTION

Pacific Environmental Services, Inc. (PES), acting as a subcontractor to CDM Federal Programs Corporation, is participating in the U.S. Environmental Protection Agency's (USEPA's) Emergency Environmental Response Support Program for the town of Libby, Montana. As part of this effort, PES was directed to review all readily available asbestos related information pertaining to six buildings owned and operated by the Libby School District #4. PES also conducted a visual walk-through of each building to verify the information. These six buildings are the Libby High School, the Libby Junior High School, Asa Wood Elementary School, Plummer Elementary School, McGrade Elementary School, and the Libby Central Administration Building located at 700-800 Louisiana Avenue.

All of the reports that PES reviewed were prepared in order to comply with the USEPA's Asbestos Hazard Emergency Response Act (AHERA), (Title 2, Section 203, 15 U.S.C. 2643) and those rules and regulations adopted pursuant to the Act as provided in 40 CFR Part 763.80 et. seq., *Asbestos Containing Materials in Schools, Final Rule and Notice,* dated October 30, 1987.

The purpose of the reviews and building walk-throughs was to determine if any of the asbestos-containing materials (ACMs) identified within these schools are known to contain the tremolite form of asbestos. In addition, the USEPA is attempting to identify potential sources of other types of asbestos fibers that may be present during the air sampling that was conducted between January 21, 2000 and January 23, 2000, within these buildings. PES was also directed to submit a letter summarizing the results of our review and building walk-through findings. The summaries for each of the six school buildings are presented in the following sections of this report.

2.0 ASBESTOS INFORMATION REVIEW AND BUILDING WALK-THROUGH, LIBBY HIGH SCHOOL, 150 EDUCATION WAY, LIBBY, MT

2.1 INTRODUCTION

PES has reviewed the following reports related to the Libby High School:

- September 6, 1988 document, *AHERA Management Plan, Libby High School, 150 Education Way, Libby, MT 59923*, prepared by Bison Engineering, Inc. (Bison).

- July 24, 1991 document, *AHERA Three Year Reinspection Summary, Libby School District #4, Libby High School, Libby, MT 59923*, prepared by Bison.

- September 26, 1995 document, *AHERA 3-Year Reinspection, Libby School District #4, Libby High School*, prepared by Bison.

PES reviewed these reports to identify the ACMs within the Libby High School. PES also noted the quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain. PES also conducted a walk through of the Libby High School on January 22, 2000 to verify the condition of the ACMs within the building. PES also noted any suspect ACMs that were not identified during the previous inspections. The information contained in the following paragraphs is based on PES' review of the reports and visual inspection of the school.

A third AHERA reinspection has been completed for the Libby High School. However, this report has not yet been submitted to the School District. Mr. William Olsen, Business Manager for the Libby Public Schools, indicated that once the reinspection reports are received, a copy will be forwarded to PES for review.

2.2 BUILDING BACKGROUND

Libby High School consists of the main high school building and the Libby Vo-Tech building. Both of these buildings were built in 1964. The Libby High School building has an approximate area of 87,774 square feet (ft^2) and the Vo-Tech building has an approximate area of 7,420 ft^2.

2.3 SURVEY FINDINGS

2.3.1 Suspect ACMs. During the original AHERA inspection performed in 1988, Bison identified a total of 10 suspect ACMs. Bison identified one additional suspect ACM (fire brick) during the first three-year reinspection. Table 1, *Suspect ACMs*, identifies the suspect ACM, the number of samples collected for each suspect ACM, and whether or not the analysis results indicated that the material contains asbestos.

Table 2.1

Suspect ACMs
Libby High School
Libby School District #4

Material Type	Number of Samples Collected	Analysis Results
9" x 9" Floor Tile	4	ACM
12" x 12" Floor Tile	1	ACM
Linoleum	1	ACM
Sheetrock	3	Non-ACM
Ceiling Tile, Adhered	2	ACM
Surfacing Material	3	Non-ACM
Pipe Joints, Elbows, and Tees	6	ACM
Boiler Gaskets	Assumed ACM (1)	Assumed ACM (1)
Fire Door	Assumed ACM (1)	Assumed ACM (1)
Transite Board	Assumed ACM (1)	Assumed ACM (1)
Fire Brick	1(2)	Non-ACM

Note 1: According to Bison's AHERA Inspection Report, "These materials are assumed to be ACM. Amounts of ACM vary with specific material but average, 45% asbestos for boiler gaskets, 30% asbestos for fire doors (core), and 25% asbestos for transite board".

Note 2: This sample was collected during the 1991 reinspection.

2.3.2 ACMs. Bison identified ACMs within the buildings using two methods. Several materials including boiler gaskets, fire door cores, and transite board, were assumed to be ACMs and were not analyzed. All other materials were sampled and analyzed for asbestos content. Table 2, *ACM Information*, lists the type of ACM, quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain according to Bison's inspection reports.

Table 2.2

ACM Information
Libby High School
Libby School District #4

Type of ACM	Analysis Results	Quantity (ft^2)	Location	Friability (Y/N)	Condition
9" x 9" Floor Tile	15.0% Chrysotile	37,850	Throughout High School Building	N	ACM with potential for damage
12" x 12" Floor Tile	5.0% Chrysotile	2,000	Upper Choir Room (High School)	N	ACM with potential for damage
Linoleum	45.0% Chrysotile	540	Lavatories #5 and #6, Room #40 Lavatories	N	ACM with potential for damage
Ceiling Tile, Adhered	2.0% Chrysotile	10,280	Throughout North Section of High School Building	Y	ACM with potential for damage
Pipe Joints, Elbows and Tees	10.0% Chrysotile, 4.0% Amosite	327	Throughout High School Building	Y	Damaged or Significantly Damaged Thermal System Insulation
Boiler Gaskets	Unknown (Assumed ACM, not sampled)	4	Boilers	Y	ACM with potential for damage
Fire Door	Unknown (Assumed ACM, not sampled)	90	Boiler Room, Hallway	N	ACM with potential for damage
Transite Board	Unknown (Assumed ACM, not sampled)	10	Room 24	N	ACM with potential for damage

2.3.3 PES' Visual Inspection. PES performed a visual inspection of the ACMs within the Libby High School on January 22, 2000. This inspection was performed to confirm the presence and condition of these ACMs, and to identify any suspect ACMs that were not identified in the AHERA reports.

The ACMs that were identified in the AHERA reports remain in the same condition as stated in the reports (Table 2). However, PES did identify four suspect ACMs that were not identified in the reports.

The following suspect ACMs were not assumed to be ACM or sampled to determine asbestos content:

- Floor Tile Mastic
- Linoleum Mastic
- Ceiling Tile Adhesive
- Drywall Wall Systems

All of the suspect ACMs should be individually sampled and analyzed to determine the asbestos content. Any suspect materials identified as ACM should be included in the AHERA Management Plan.

2.4 CONCLUSIONS

The tremolite form of asbestos was not normally used as a constituent during the manufacturing of asbestos-containing building materials. Therefore, it is rarely identified when these materials are analyzed to determine their asbestos content. PES' review of the Libby High School Management Plan and visual inspection did not identify any ACM in the Libby High School that contains the tremolite form of asbestos. However, because several suspect ACMs were assumed to contain asbestos and never analyzed, and several other suspect ACMs were not assumed or analyzed, PES can not say with certainty that tremolite is not a constituent of any of the ACMs within the Libby High School.

A third AHERA reinspection has been completed for the Libby High School. However, this report has not yet been submitted to the School District. If this report identifies any new information about this building, PES will issue an update to this letter which discusses the new information.

2.5 LIMITATIONS. This summary has been prepared for the use of CDM Federal Programs Corporation while assisting in the USEPA's Emergency Environmental Response Support Program for the town of Libby, Montana. The information in this report has been prepared solely for the use of CDM Federal Programs Corporation and its use by other parties shall be at their own risk.

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3.0 ASBESTOS INFORMATION REVIEW AND BUILDING WALK-THROUGH, LIBBY JUNIOR HIGH SCHOOL, 101 SKI ROAD, LIBBY, MT

3.1 INTRODUCTION

PES has reviewed the following reports related to the Libby Junior High School:

- September 6, 1988 document, *AHERA Management Plan, Libby Junior High School, 101 Ski Road, Libby, MT 59923*, prepared by Bison Engineering, Inc. (Bison).
- July 24, 1991 document, *AHERA Three Year Reinspection Summary, Libby School District #4, Libby Junior High School, Libby, MT 59923*, prepared by Bison.
- September 26, 1995 document, *AHERA 3-Year Reinspection, Libby School District #4, Libby Junior High School*, prepared by Bison.

PES reviewed these reports to identify the ACMs within the Libby Junior High School. PES also noted the quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain. PES also conducted a walk through of the Libby Junior High School on January 23, 2000 to verify the condition of the ACMs within the building. PES also noted any suspect ACMs that were not identified during the previous inspections. The information contained in the following paragraphs is based on PES' review of the reports and visual inspection of the school.

A third AHERA reinspection has been completed for the Libby Junior High School. However, this report has not yet been submitted to the School District. Mr. William Olsen, Business Manager for the Libby Public Schools, indicated that once the reinspection reports are received, a copy will be forwarded to PES for review.

3.2 BUILDING BACKGROUND

Libby Junior High School consists of the main Junior High School building with six "pods" and the Junior High Gym building. Both buildings were built in 1969. The Libby Junior High School building has an approximate area of 85,335 square feet (ft^2) and the Junior High Gym building has an approximate area of 20,000 ft^2.

3.3 SURVEY FINDINGS

3.3.1 Suspect ACMs. During the original AHERA inspection performed in 1988, Bison identified a total of six suspect ACMs. Bison identified two additional suspect ACMs (textured paint and spackling compound) during the first three-year reinspection. Table 3.1, *Suspect ACMs*, identifies the suspect ACM, the number of samples collected for each suspect ACM, and whether or not the analysis results indicated that the material contained asbestos.

Table 3.1

Suspect ACMs
Libby Junior High School
Libby School District #4

Material Type	Number of Samples Collected	Analysis Results
9" x 9" Floor Tile	1	ACM
Ceiling Tile, Adhered	1	Non-ACM
Sheetrock	1	Non-ACM
Ceiling Tile, Suspended	2	Non-ACM
Table Top Material	1	ACM
Textured Paint	3(1)	Non-ACM
Spackling Compound	1(1)	Non-ACM

Note 1: These samples were collected during the 1991 reinspection.

3.3.2 ACMs. No suspect ACMs in the Libby Junior High School were assumed to be ACM. All materials were sampled and analyzed for asbestos content. Table 3.2, *ACM Information*, lists the type of ACM, quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain according to Bison's inspection reports.

Table 3.2

ACM Information
Libby Junior High School
Libby School District #4

Type of ACM	Analysis Results	Quantity (ft^2)	Location	Friability (Y/N)	Condition
9" x 9" Floor Tile	15.0% Chrysotile	50,335	Throughout Both Buildings	N	ACM with potential for damage
Table Top Material	5.0% Chrysotile	700	Rooms 501, 502, 503, 504, 505, 506, 507, 508	N	ACM with potential for damage

3.3.3 PES' Visual Inspection. PES performed a visual inspection of the ACMs within the Libby Junior High School on January 23, 2000. This inspection was performed to confirm the presence and condition of these ACMs, and to identify any suspect ACMs that were not identified in the AHERA reports.

The ACMs that were identified in the AHERA reports remain in the same condition as stated in the reports (Table 4). However, PES did identify three suspect ACMs that were not identified in the reports. The following suspect ACMs were not assumed to be ACM or sampled to determine asbestos content:

- Floor Tile Mastic
- Ceiling Tile Mastic
- Drywall Wall Systems

All of the suspect ACMs should be individually sampled and analyzed to determine the asbestos content. Any suspect materials identified as ACM should be included in the AHERA Management Plan.

3.4 CONCLUSIONS

The tremolite form of asbestos was not normally used as a constituent during the manufacturing of asbestos-containing building materials. Therefore, it is rarely identified when these materials are analyzed to determine their asbestos content. PES' review of the Libby Junior High School Management Plan and visual inspection did not identify any ACM in the Libby Junior High School that contains the tremolite form of asbestos. However, because several suspect ACMs have not been sampled or analyzed, PES can not say with certainty that tremolite is not a constituent of any of the ACMs within the Libby Junior High School.

A third AHERA reinspection has been completed for the Libby Junior High School. However, this report has not yet been submitted to the School District. If this report identifies any new information about this building, PES will issue an update to this letter which discusses the new information.

3.5 LIMITATIONS

This summary has been prepared for the use of CDM Federal Programs Corporation while assisting in the USEPA's Emergency Environmental Response Support Program for the town of Libby, Montana. The information in this report has been prepared solely for the use of CDM Federal Programs Corporation and its use by other parties shall be at their own risk.

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4.0 ASBESTOS INFORMATION REVIEW AND BUILDING WALK-THROUGH ASA WOOD ELEMENTARY SCHOOL, 700 IDAHO AVENUE, LIBBY, MT

4.1 INTRODUCTION

PES has reviewed the following reports related to the Asa Wood Elementary School:

- September 6, 1988 document, *AHERA Management Plan, Asa Wood Elementary School, 700 Idaho Avenue, Libby, MT 59923*, prepared by Bison Engineering, Inc. (Bison).
- July 24, 1991 document, *AHERA Three Year Reinspection Summary, Libby School District #4, Asa Wood Elementary School, 700 Idaho Avenue, Libby, MT 59923*, prepared by Bison.
- September 26, 1995 document, *AHERA 3-Year Reinspection, Libby School District #4, Asa Wood Elementary School*, prepared by Bison.

PES reviewed these reports to identify the ACMs within the Asa Wood Elementary School. PES also noted the quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain. PES also conducted a walk through of Asa Wood Elementary School on January 23, 2000 to verify the condition of the ACMs within the two buildings. PES also noted any suspect ACMs that were not identified during the previous inspections. The information contained in the following paragraphs is based on PES' review of the reports and visual inspection of the school.

A third AHERA reinspection has been completed for the Asa Wood Elementary School. However, this report has not yet been submitted to the School District. Mr. William Olsen, Business Manager for the Libby Public Schools, indicated that once the reinspection reports are received, a copy will be forwarded to PES for review.

4.2 BUILDING BACKGROUND

Asa Wood Elementary School consists of a main building that was built in 1953 with additions in 1956, 1960, and 1967. The footprint of the current building covers approximately 41,124 square feet (ft^2). In addition to the main building, there is an 800 ft^2 Janitor/Storage Building located on school grounds that was built in 1970. Both of these buildings were included in the AHERA inspection reports.

4.3 SURVEY FINDINGS

4.3.1 Suspect ACMs. During the original AHERA inspection performed in 1988, Bison identified a total of 10 suspect ACMs. Bison did not identify any additional suspect ACMs during the three-year reinspections. Table 4.1, *Suspect ACMs*, identifies the suspect ACM, the number of samples collected for each suspect ACM, and whether or not the analysis results indicated that the material contained asbestos.

Table 4.1

Suspect ACMs
Asa Wood Elementary School
Libby School District #4

Material Type	Number of Samples Collected	Analysis Results
9" x 9" Floor Tile	4	ACM
Linoleum	2	ACM
Sheetrock	2	Non-ACM
Lathe and Plaster	3 (1)	Non-ACM
Boiler Tank, Stack Insulation	3	Non-ACM
Pipe Joints, Elbows, and Tees	6 (Assumed ACM (2))	Assumed ACM (2)
"Aircell" Pipe Insulation	Assumed ACM (2)	Assumed ACM (2)
"85 Mag" Pipe Insulation	Assumed ACM (2)	Assumed ACM (2)
Boiler Gaskets	Assumed ACM (2)	Assumed ACM (2)
Fire Door	Assumed ACM (2)	Assumed ACM (2)

Note 1: Two samples of this material were collected during the 1988 inspection. An additional sample was collected during the 1991 reinspection.

Note 2: According to Bison's AHERA Inspection Report, "These materials are assumed to be ACM. Amounts of ACM vary with specific material but average 10% asbestos for pipe joints, elbows and tees, 75% asbestos for "Aircell", 15% asbestos for "85 mag", 30% asbestos for fire doors (core), and 25% asbestos for boiler gaskets".

4.3.2 ACMs. Bison identified ACMs within the buildings using two methods. Several materials including pipes, elbows, and tees; "aircell" insulation; "85 mag" insulation; boiler gasketing material; and, fire door cores were assumed to be ACM and not analyzed. All other materials were sampled and analyzed for asbestos content. Table 4.2, *ACM Information*, lists the type of ACM, quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain according to Bison's inspections.

Table 4.2

ACM Information
Asa Wood Elementary School
Libby School District #4

Type of ACM	Analysis Results	Quantity (ft^2)	Location	Friability (Y/N)	Condition
9" x 9" Floor Tile	5.0% Chrysotile 1.0% Actinolite	25,220	Throughout Main Building	N	ACM with potential for damage
Linoleum	5.0% Chrysotile	800	Janitorial/Storage Building	N	ACM with potential for damage
Pipe Joints, Elbows, and Tees	Assumed to be ACM	370	Boiler Room, Crawl Space (1953 Section)	Y	Damaged or Significantly Damaged Thermal Systems Insulation (TSI)
"Aircell" Insulation	Assumed to be ACM	95	Crawl Space (1953 Section), Boiler Room	Y	Crawlspace Damaged or Significantly Damaged TSI Boiler Room ACM with potential for damage
"85 Mag" Insulation	Assumed to be ACM	690	Crawl Space (1953 Section), Boiler Room, and Gym	Y	Crawlspace Damaged or Significantly Damaged TSI Boiler Room, Gym ACM with potential for damage
Boiler Gaskets	Assumed to be ACM	4	Boiler Room	N	ACM with potential for damage
Fire Doors (Core)	Assumed to be ACM	60	Boiler Room	N	ACM with potential for damage

4.3.3 PES' Visual Inspection. PES performed a visual inspection of the ACMs within Asa Wood Elementary School on January 23, 2000. This inspection was performed to confirm the presence and condition of these ACMs, and to identify any suspect ACMs that were not identified in the AHERA reports.

The ACMs that were identified in the AHERA reports remain in the same

condition as stated in the reports (Table 6). However, PES did identify several suspect ACMs that were not identified in the reports. The following suspect ACMs were not assumed to be ACM or sampled to determine asbestos content.

- 12" x 12" Interlocking Ceiling Tile (Small Holes)
- 12" x 12" Interlocking Ceiling Tile (Large Holes)
- 12" x 12" Interlocking Ceiling Tile (Holes and Fissures)
- 12" x 12" Interlocking Ceiling Tile (Fissures)
- 12" x 12" Interlocking Ceiling Tile (Plain)
- 16" x 16" Interlocking Ceiling Tile (Plain)
- Floor Tile Mastic
- Linoleum Mastic
- Drywall Wall Systems

PES also identified one hallway fire door that is not included in the AHERA Management Plan for this school.

All of the suspect ACMs should be individually sampled and analyzed to determine the asbestos content. Any suspect materials identified as ACM should be included in the AHERA Management Plan. The hallway fire door, which is assumed to be ACM, should also be included in the AHERA Management Plan.

Lastly, several school representatives suspected that vermiculite insulation was blown into the walls of the main building. Vermiculite insulation is a suspect ACM, and may contain the tremolite form of asbestos. The AHERA inspections did not identify vermiculite insulation within the main building. PES could not verify the presence or absence of this material without performing destructive sampling to access the walls of the building.

4.4 CONCLUSIONS

The tremolite form of asbestos was not normally used as a constituent during the manufacturing of asbestos-containing building materials. Therefore, it is rarely identified when these materials are analyzed to determine their asbestos content. PES' review of the Asa Wood Management Plan and visual inspection did not identify any ACM in the Asa Wood Elementary School that contains the tremolite form of asbestos. However, because several suspect ACMs were assumed to contain asbestos and never analyzed, and several other suspect ACMs were not assumed or analyzed, PES can not say with certainty that tremolite is not a constituent of any of the ACMs within the Asa Wood Elementary School.

Also, vermiculite insulation is suspected of being blown into the walls of this school. Vermiculite insulation is a suspect ACM and may contain the tremolite form of asbestos. As stated earlier, PES could not verify the presence or absence of this material without performing destructive sampling.

A third AHERA reinspection has been completed for the Asa Wood Elementary School. However, this report has not yet been submitted to the School District. If this report identifies any new information about this school, PES will issue an update to this letter which discusses the new information.

4.5 LIMITATIONS

This summary has been prepared for the use of CDM Federal Programs Corporation while assisting in the USEPA's Emergency Environmental Response Support Program for the town of Libby, Montana. The information in this report has been prepared solely for the use of CDM Federal Programs Corporation and its use by other parties shall be at their own risk.

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5.0 ASBESTOS INFORMATION REVIEW AND BUILDING WALK-THROUGH PLUMMER ELEMENTARY SCHOOL, 247 INDIAN HEAD ROAD, LIBBY, MT

5.1 INTRODUCTION

PES has reviewed the following reports related to the Plummer Elementary School:

- September 6, 1988 document, *AHERA Management Plan, Plummer Elementary School, 247 Indian Head Road, Libby, MT 59923*, prepared by Bison Engineering, Inc. (Bison).

- July 24, 1991 document, *AHERA Three Year Reinspection Summary, Libby School District #4, Plummer Elementary School, Libby, MT 59923*, prepared by Bison.

- September 26, 1995 document, *AHERA 3-Year Reinspection, Libby School District #4, Plummer Elementary School*, prepared by Bison.

PES reviewed these reports to identify the ACMs within the Plummer Elementary School. PES also noted the quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain. PES also conducted a walk through of the Plummer Elementary School on January 22, 2000 to verify the condition of the ACMs within the building. PES also noted any suspect ACMs that were not identified during the previous inspections. The information contained in the following paragraphs is based on PES' review of the reports and visual inspection of the school.

A third AHERA reinspection has been completed for the Plummer Elementary School. However, this report has not yet been submitted to the School District. Mr. William Olsen, Business Manager for the Libby Public Schools, indicated that once the reinspection reports are received, a copy will be forwarded to PES for review.

5.2 BUILDING BACKGROUND

Plummer Elementary School was built in 1968. At some point in time, a new wing was added to the building, however, the AHERA reports did not identify a date for the new construction. The present building has an approximate total area of 37,070 square feet (ft^2).

5.3 SURVEY FINDINGS

5.3.1 Suspect ACMs. During the original AHERA inspection performed in 1988, Bison identified a total of four suspect ACMs. Bison identified two additional suspect ACMs (spackling compound and vibration joint cloth) during the first three-year reinspection. Table 5.1, *Suspect ACMs*, identifies the suspect ACM, the number of samples collected for each suspect ACM, and whether or not the analysis results indicated that the material contained asbestos.

Table 5.1

Suspect ACMs
Plummer Elementary School
Libby School District #4

Material Type	Number of Samples Collected	Analysis Results
9" x 9" Floor Tile	4	ACM
Insulation on Boilers, Tanks, and Stacks	1	ACM
Pipe Joints, Elbows, and Tees	6	ACM
Sheet Rock	1	Non-ACM
Spackling Compound	2[1]	Non-ACM
Vibration Joint Cloth	Assumed ACM[2]	Assumed ACM[2]

Note 1: Both samples of this material were collected during the 1991 reinspection.
Note 2: Bison assumed this material to be an ACM without sampling.

5.3.2 ACMs. Bison identified ACMs within the buildings using two methods. The vibration joint cloth was assumed to be an ACM and was not analyzed. All other materials were sampled and analyzed for asbestos content. Table 5.2, *ACM Information*, lists the type of ACM, quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain according to Bison's inspection reports.

Table 5.2

ACM Information
Plummer Elementary School
Libby School District #4

Type of ACM	Analysis Results	Quantity (ft^2)	Location	Friability (Y/N)	Condition
9" x 9" Floor Tile	15.0% Chrysotile	6,120	Throughout Building	N	ACM with potential for damage
Insulation on Boilers, Tanks, and Stacks	15.0% Chrysotile, <1.0% Amosite	200	Boiler Room	Y	ACM with potential for damage
Pipe Joints, Elbows, and Tees	5.0% Chrysotile, 2.0% Amosite	190	Boiler Room, Crawlspace	Y	Damaged or Significantly Damaged Thermal System Insulation
Vibration Joint Cloth	Unknown (Assumed ACM, not sampled)	4	Air Handler Room	N	ACM with potential for damage

5.3.3 PES' Visual Inspection. PES performed a visual inspection of the ACMs within the Plummer Elementary School on January 22, 2000. This inspection was performed to confirm the presence and condition of these ACMs, and to identify any suspect ACMs that were not identified in the AHERA reports.

The ACMs that were identified in the AHERA reports remain in the same condition as stated in the reports (Table 8). However, PES did identify two suspect ACMs that were not identified in the reports. The following suspect ACMs were not assumed to be ACM or sampled to determine asbestos content:

- Floor Tile Mastic
- Drywall Wall Systems

PES also identified one hallway fire door between the old and new sections of the building that is not included in the AHERA Management Plan for this school.

All of the suspect ACMs should be individually sampled and analyzed to determine the asbestos content. Any suspect materials identified as ACM should be included in the AHERA Management Plan. The hallway fire door, which is assumed to be an ACM, should also be included in the AHERA Management Plan.

5.4 CONCLUSIONS

The tremolite form of asbestos was not normally used as a constituent during the manufacturing of asbestos-containing building materials. Therefore, it is rarely identified when these materials are analyzed to determine their asbestos content. PES' review of the Plummer Elementary School Management Plan and visual inspection did not identify any ACM in Plummer Elementary School that contains the tremolite form of asbestos. However, because one suspect ACM was assumed to contain asbestos and never analyzed, and two other suspect ACMs were not assumed or analyzed, PES can not say with certainty that tremolite is not a constituent of any of the ACMs within Plummer Elementary School.

A third AHERA reinspection has been completed for the Plummer Elementary School. However, this report has not yet been submitted to the School District. If this report identifies any new information about this building, PES will issue an update to this letter which discusses the new information.

5.5 LIMITATIONS

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6.0 ASBESTOS INFORMATION REVIEW AND BUILDING WALK-THROUGH McGRADE ELEMENTARY SCHOOL, 899 FARM TO MARKET ROAD, LIBBY, MT

6.1 INTRODUCTION

PES has reviewed the following reports related to the McGrade Elementary School:

- September 6, 1988 document, *AHERA Management Plan, McGrade Elementary School, 899 Farm to Market Road, Libby, MT 59923*, prepared by Bison Engineering, Inc. (Bison).
- July 24, 1991 document, *AHERA Three Year Reinspection Summary, Libby School District #4, McGrade Elementary School, Libby, MT 59923*, prepared by Bison.
- September 26, 1995 document, *AHERA 3-Year Reinspection, Libby School District #4, McGrade Elementary School*, prepared by Bison.

PES reviewed these reports to identify the ACMs within the McGrade Elementary School. PES also noted the quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain. PES also conducted a walk through of the McGrade Elementary School on January 22, 2000 to verify the condition of the ACMs within the building. PES also noted any suspect ACMs that were not identified during the previous inspections. The information contained in the following paragraphs is based on PES' review of the reports and visual inspection of the school.

A third AHERA reinspection has been completed for the McGrade Elementary School. However, this report has not yet been submitted to the School District. Mr. William Olsen, Business Manager for the Libby Public Schools, indicated that once the reinspection reports are received, a copy will be forwarded to PES for review.

6.2 BUILDING BACKGROUND

McGrade Elementary School was built in 1968. At some point in time, a new wing was added to the building, however, the AHERA reports did not identify a date for the new construction. The present building has an approximate total area of 37,070 square feet (ft^2).

6.3 SURVEY FINDINGS

6.3.1 Suspect ACMs. During the original AHERA inspection performed in 1988, Bison identified a total of eight suspect ACMs. Bison identified two additional suspect ACMs (spackling compound and vibration joint cloth) during the three-year reinspections. Table 6.1, *Suspect ACMs*, identifies the suspect ACM, the number of samples collected for each suspect ACM, and whether or not the analysis results indicated that the material contained asbestos.

Table 6.1

Suspect ACMs
McGrade Elementary School
Libby School District #4

Material Type	Number of Samples Collected	Analysis Results
9" x 9" Floor Tile	3	ACM
Insulation on Boilers, Tanks, and Stacks	1	ACM
Pipe Joints, Elbows, and Tees	6	ACM
Bulk Insulation	1	Non-ACM
Sheet Rock	2	Non-ACM
Beam Covering	1	Non-ACM
Ceiling Tile, Suspended	1	Non-ACM
Fire Door	Assumed ACM(2)	Assumed ACM(2)
Spackling Compound	1(1)	Non-ACM
Vibration Joint Cloth	Assumed ACM(2)	Assumed ACM(2)

Note 1: This sample was collected during the 1991 reinspection.
Note 2: Bison assumed these materials to be ACMs without sampling.

6.3.2 ACMs. Bison identified ACMs within the buildings using two methods. The fire door and vibration joint cloth were assumed to be ACMs and were not analyzed. All other materials were sampled and analyzed for asbestos content. Table 6.2, *ACM Information*, lists the type of ACM, quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain according to Bison's inspection reports.

Table 6.2

ACM Information
McGrade Elementary School
Libby School District #4

Type of ACM	Analysis Results	Quantity (ft^2)	Location	Friability (Y/N)	Condition
9" x 9" Floor Tile	15.0% Chrysotile	12,030	Throughout Building	N	ACM with potential for damage
Insulation on Boilers, Tanks, and Stacks	15.0% Chrysotile, <1.0% Amosite	200	Boiler Room	Y	Damaged or *Significantly* Damaged Thermal System Insulation
Pipe Joints, Elbows, and Tees	5.0% Chrysotile, 2.0% Amosite	190	Boiler Room, Crawlspace	Y	Damaged or Significantly Damaged Thermal System Insulation
Fire Door	Unknown (Assumed ACM, not sampled)	30	Boiler	N	ACM with potential for damage
Vibration Joint Cloth	Unknown (Assumed ACM, not sampled)	4	Air Handler Room	N	ACM with potential for damage

6.3.3 PES' Visual Inspection. PES performed a visual inspection of the ACMs within the McGrade Elementary School on January 22, 2000. This inspection was performed to confirm the presence and condition of these ACMs, and to identify any suspect ACMs that were not identified in the AHERA reports.

The ACMs that were identified in the AHERA reports remain in the same condition as stated in the reports (Table 10). However, PES did identify two *suspect ACMs that were not identified in the reports.* The following suspect ACMs were not assumed to be ACM or sampled to determine asbestos content:

- Floor Tile Mastic
- Drywall Wall Systems

PES also identified one hallway fire door between the old and new sections of the building that is not included in the AHERA Management Plan for this school.

All of the suspect ACMs should be individually sampled and analyzed to determine the asbestos content. Any suspect materials identified as ACM should

be included in the AHERA Management Plan. The hallway fire door, which is assumed to be an ACM, should also be included in the AHERA Management Plan.

6.4 CONCLUSIONS

The tremolite form of asbestos was not normally used as a constituent during the manufacturing of asbestos-containing building materials. Therefore, it is rarely identified when these materials are analyzed to determine their asbestos content. PES' review of the McGrade Elementary School Management Plan and visual inspection did not identify any ACM in the McGrade Elementary School that contains the tremolite form of asbestos. However, because one suspect ACM was assumed to contain asbestos and never analyzed, and two other suspect ACMs were not assumed or analyzed, PES can not say with certainty that tremolite is not a constituent of any of the ACMs within the McGrade Elementary School.

A third AHERA reinspection has been completed for the McGrade Elementary School. However, this report has not yet been submitted to the School District. If this report identifies any new information about this building, PES will issue an update to this letter which discusses the new information.

6.5 LIMITATIONS

This summary has been prepared for the use of CDM Federal Programs Corporation while assisting in the USEPA's Emergency Environmental Response Support Program for the town of Libby, Montana. The information in this report has been prepared solely for the use of CDM Federal Programs Corporation and its use by other parties shall be at their own risk.

PES assumes no responsibility for conditions that did not come to its actual knowledge or for conditions not recognized as environmentally unacceptable at the time this report was prepared. PES has not independently verified information provided by the Libby School District, their representatives, consultants, or others. PES assumes no liability for loss resulting from errors or omissions arising from the use or inaccurate/incomplete information or misrepresentations by the Libby School District, their representatives, consultants, or others.

7.0 ASBESTOS INFORMATION REVIEW AND BUILDING WALK-THROUGH LIBBY CENTRAL ADMINISTRATION BUILDING, 700-800 LOUISIANA AVENUE, LIBBY, MT

7.1 INTRODUCTION

PES has reviewed the following reports related to the Libby Central Administration Building:

- September 6, 1988 document, *AHERA Management Plan, Central Warehouse, 700-800 Louisiana Avenue, Libby, MT 59923*, prepared by Bison Engineering, Inc. (Bison).
- July 24, 1991 document, *AHERA Three Year Reinspection Summary, Libby School District #4, Central Warehouse, Libby, MT 59923*, prepared by Bison.
- September 26, 1995 document, *AHERA 3-Year Reinspection, Libby School District #4, Libby Central Administration Building*, prepared by Bison.

PES reviewed these reports to identify the ACMs within the Libby Central Administration Building. PES also noted the quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain. PES also conducted a walk through of the Libby Central Administration Building on January 21, 2000 to verify the condition of the ACMs within the building. PES also noted any suspect ACMs that were not identified during the previous inspections. The information contained in the following paragraphs is based on PES' review of the reports and visual inspection of the school.

A third AHERA reinspection has been completed for the Libby Central Administration Building. However, this report has not yet been submitted to the School District. Mr. William Olsen, Business Manager for the Libby Public Schools, indicated that once the reinspection reports are received, a copy will be forwarded to PES for review.

7.2 BUILDING BACKGROUND

The Libby Central Administration Building was built in 1949. The building was used as a warehouse until the mid 1990s when it was converted to an administrative building. The building has an approximate total area of 24,288 square feet (ft^2).

7.3 SURVEY FINDINGS

7.3.1 Suspect ACMs. During the original AHERA inspection performed in 1988, Bison identified a total of 10 suspect ACMs. Bison identified one additional suspect ACM (acoustical material) during the first three-year reinspection. Table 11, *Suspect ACMs*, identifies the suspect ACM, the number of samples collected for each suspect ACM, and whether or not the analysis results indicated that the material contained asbestos.

Table 7.1

Suspect ACMs
Libby Central Administration Building
Libby School District #4

Material Type	Number of Samples Collected	Analysis Results
9" x 9" Floor Tile	1	ACM
12" x 12" Floor Tile	1	ACM
Linoleum	1	ACM
Ceiling Tile, Suspended	1	Non-ACM
Lathe and Plaster	2	Non-ACM
Surfacing Plaster	2(1)	Non-ACM
Pipe Joints, Elbows, and Tees	Assumed ACM (2)	Assumed ACM (2)
"Aircell" Pipe Insulation	Assumed ACM (2)	Assumed ACM (2)
"85 Mag" Pipe Insulation	Assumed ACM (2)	Assumed ACM (2)
Fire Door	Assumed ACM (2)	Assumed ACM (2)
Acoustical Material	1	Non-ACM

Note 1: One sample of this material was collected during the 1988 inspection. An additional sample was collected during the 1991 reinspection.

Note 2: According to Bison's AHERA Inspection Report, "These materials are assumed to be ACM. Amounts of ACM vary with specific material but average 10% asbestos for pipe joints, elbows and tees, 75% asbestos for "Aircell", 15% asbestos for "85 mag", and 30% asbestos for fire doors (core)".

7.3.2 ACMs. Bison identified ACMs within the buildings using two methods. Several materials including pipes, elbows, and tees; "aircell" insulation; "85 mag" insulation; and, fire door cores were assumed to be ACMs and were not analyzed. All other materials were sampled and analyzed for asbestos content. Table 12, *ACM Information*, lists the type of ACM, quantity of ACM, location of ACM, friability and condition of ACM, and percentage of asbestos by type that these materials contain according to Bison's inspection reports.

Table 7.2

ACM Information
Libby Central Administration Building
Libby School District #4

Type of ACM	Analysis Results	Quantity (ft^2)	Location	Friability (Y/N)	Condition
9" x 9" Floor Tile	5.0% Chrysotile 10.0% Anthophyllite	600	Stairwell Landings	N	ACM with potential for damage
12" x 12" Floor Tile	5.0% Chrysotile	260	Basement Hallway, Basement Closet	N	ACM with potential for damage
Linoleum	43.0% Chrysotile	100	Basement Storage Room	N	ACM with potential for damage
Pipe Joints, Elbows and Tees	Assumed to be ACM	100	1st Floor Janitors Closet, Throughout Basement	Y	ACM with potential for damage
"Aircell" Insulation	Assumed to be ACM	650	Throughout Basement	Y	ACM with potential for damage
"85 Mag" Insulation	Assumed to be ACM	200	Throughout Basement	Y	ACM with potential for damage
Fire Doors (Core)	Assumed to be ACM	30	1st Floor Hall, Basement Hall	N	ACM with potential for damage

7.3.3 PES' Visual Inspection. PES performed a visual inspection of the ACMs within the Libby Central Administration Building on January 21, 2000. This inspection was performed to confirm the presence and condition of these ACMs, and to identify any suspect ACMs that were not identified in the AHERA reports.

The ACMs that were identified in the AHERA reports remain in the same condition as stated in the reports (Table 12). However, PES did identify six suspect ACMs that were not identified in the reports. The following suspect ACMs were not assumed to be ACM or sampled to determine asbestos content:

- Floor Tile Mastic
- Linoleum Mastic
- Ceiling Tile
- Ceiling Tile Adhesive

- Bulletin Board Material
- Drywall Wall Systems

PES also identified one hallway fire door on the second floor that is not included in the AHERA Management Plan for this school.

All of the suspect ACMs should be individually sampled and analyzed to determine the asbestos content. Any suspect materials identified as ACM should be included in the AHERA Management Plan. The hallway fire door, which is assumed to be ACM, should also be included in the AHERA Management Plan.

7.4 CONCLUSIONS

The tremolite form of asbestos was not normally used as a constituent during the manufacturing of asbestos-containing building materials. Therefore, it is rarely identified when these materials are analyzed to determine their asbestos content. PES' review of the Libby Central Administration Building Management Plan and visual inspection did not identify any ACM in the Libby Central Administration Building that contains the tremolite form of asbestos. However, because several suspect ACMs were assumed to contain asbestos and never analyzed, and several other suspect ACMs were not assumed or analyzed, PES can not say with certainty that tremolite is not a constituent of any of the ACMs within the Libby Central Administration Building.

A third AHERA reinspection has been completed for the Libby Central Administration Building. However, this report has not yet been submitted to the School District. If this report identifies any new information about this building, PES will issue an update to this letter which discusses the new information.

7.5 LIMITATIONS

This summary has been prepared for the use of CDM Federal Programs Corporation while assisting in the USEPA's Emergency Environmental Response Support Program for the town of Libby, Montana. The information in this report has been prepared solely for the use of CDM Federal Programs Corporation and its use by other parties shall be at their own risk.

PES assumes no responsibility for conditions that did not come to its actual knowledge or for conditions not recognized as environmentally unacceptable at the time this report was prepared. PES has not independently verified information provided by the Libby School District, their representatives, consultants, or others. PES assumes no liability for loss resulting from errors or omissions arising from the use or inaccurate/incomplete information or misrepresentations by the Libby School District, their representatives, consultants, or others.

CDM

Memorandum

To: *Mark Raney, Volpe*

From: *Karen Repine, Field Team Leader*
Robert R. Alexander, CHMM, Lead Inspector

Date: *July 28, 2008*

Subject: *Libby Schools Visual Vermiculite Investigation Summary*

From June 18 - 24, 2008, CDM Federal Programs Corporation (CDM) conducted visual inspections for vermiculite at five schools in the Libby school district. The inspections were conducted in accordance with the *Final Technical Memorandum, Libby Public School Inspection, Libby, Montana* dated June 17, 2008. The following schools were inspected as part of this investigation:

- *Libby Administrative Building* - 724 Louisiana Avenue
- Asa Wood Elementary School - 700 Idaho Avenue
- Libby Middle School - 101 Ski Road
- Libby High School - 150 Education Way
- Kootenai Head Start - 247 Indian Head Road (formerly Plummer Elementary)

The objectives of the inspections were as follows:

1. Identify sources or exposure pathways (e.g., penetrations, damaged walls, etc.) of vermiculite-containing insulation (VCI) and/or vermiculite-containing building material (VCBM) within the interior and exterior portion of the school buildings.
2. Gather information will be to develop a sampling and analysis plan for the collection of indoor air samples during the 2008-2009 school year.
3. Conduct outdoor inspections in areas of new construction and/or soil disturbances at two schools (Asa Wood and Libby Middle School) to determine the presence or absence of vermiculite-containing soil (VCS).

The CDM inspection team consists of the following personnel:

Dee Warren, PMP - Project Manager
Thomas E. Cook, CHMM - Task Manager
Karen Repine - Field Team Leader
Robert R. Alexander, CHMM – Lead Inspector
Damon Repine, GSP – Technical Resource and Health and Safety
Terry Crowell – Quality Assurance Coordinator
Simon Wilson – Soil Sampling Lead and Assistant Inspector
Chris Roland – Assistant Inspector
Adam Smith – Soil Sampling Technician and Assistant Inspector

Mr. Alexander is an Accredited Asbestos Inspector and Asbestos Project Designer with the State of Montana. His accreditation number is MTA-2287.

Limits of Investigations

The investigation was limited to the five schools listed above. The building inspections involved conducting visual inspections of the interior and exterior of each building for the presence of vermiculite. The inspections focused on finding and documenting the location of vermiculite or VCI within the living space of the buildings; checking open walls, ceilings, and floor penetrations for VCI or VCBM; and inspecting outdoor walls and perimeter soils for vermiculite or VCI. No bulk samples of building materials or VCI were collected. The space above drop ceilings was checked, however, no other form of intrusive investigation (e.g., removal of light switches, power outlets, vents, lights, etc.) was performed. Internal components of the heating, ventilation, and air conditioning systems were not included in these inspections. With the exception of Libby Middle School (which has electric heat), most of the school buildings inspected had asbestos-containing thermal system insulation; thus, pipe chases and crawl spaces were also not inspected. To address soil data gaps, further sampling and detailed visual inspection of exterior soils was implemented at Asa Wood Elementary.

Summary of Findings

This section presents a summary of the Libby school inspections conducted as described above. The findings are also summarized in Table 1.

Libby Administrative Building

Inspection of the Libby Administrative Building (a.k.a. "Central Building") was conducted on June 18, 2008. A tour and access to the building was provided by Kirby Maki, Libby Schools Superintendent. Mr. Maki noted that VCI had been removed from the building within the past few years above some of the ceilings on the second floor.

No VCI was observed in the interior or the exterior of the building during the inspection. However, VCBM was found in the form of plaster located in the second floor storage room located next to the recreation room. The location where this plaster was found is shown on page 2 of Attachment A. The plaster was in good condition and not friable (Appendix F). Other possible vermiculite or VCI locations noted in the field logbook were determined to be negative for vermiculite or VCI upon further inspection. A copy of the field logbook notes are provided in Attachment B.

Asa Wood Elementary

Inspection and soil sampling at the Asa Wood Elementary School was conducted on June 19 and 20, 2008. Mr. Maki introduced us to Tony Snyder, a custodian at Asa Wood. This school building is known to contain VCI as insulation within the original exterior cinder block walls as it was exposed as a result of wall damage from snow removal equipment earlier this year.

The interior and exterior perimeter inspection had no vermiculite or VCI observed. However, VCBM are present in the form of wall plaster in the Reading Coach Room (Room 8, east wing) and wall plaster next to the electrical boxes at the side of the stage on the north side. The locations where this plaster was found is shown on page 3 of Attachment A. The plaster was in good condition and not friable (Appendix F).

In addition to the interior and outdoor perimeter inspection, the following soil sampling and visual inspection activities were conducted on the Asa Wood Elementary school grounds:

- Visual inspection of the soil and collection of 30-point composite soil samples within 5 feet on each side of the walking track every 150 linear feet to a depth of 3-inches below ground surface.
- Visual inspection and collection of one 30-point composite soil sample from the new playground area by the north parking lot.
- Visual inspection of the areas of the school grounds with historic sample results of trace or <1% Libby Amphibole (LA) asbestos referenced in Figure 1-1 of the June 17, 2008, technical memorandum for the school inspections. No additional soil samples were collected from these areas.

A map of the Asa Wood historic and new sampling locations is provided in Attachment C. A total of 18 soil samples were collected from the Asa Wood Elementary grounds using the 30-point visual inspection procedures as described in the Response Action Sampling and Analysis Plan (RA SAP) (CDM 2008). Copies of the soil field sample data sheets (FSDS) for these samples are provided in Attachment D.

The polarized light microscopy – visual estimation (PLM-VE) sample results were trace for LA asbestos for 2 of the 18 soil samples collected from along the walking track, SI-00004 and SI-00017. Sample SI-00004 is located near the middle of the eastern segment of the walking track and sample SI-00017 is located on a track segment south of the school (see Attachment C). All remaining PLM-VE results were non-detect for LA asbestos. A copy of the PLM-VE sample results are provided in Attachment E. Visible vermiculite was observed in five of the 18 samples (SI-00003, SI-00004, SI-00010, SI-00011, and SI-00012). All five samples had only one "low" level observation out of the 30 observation points as described in the field visual inspection procedure. Only one sample (SI-00004) had detections by both PLM-VE and field-visible observation.

The PLM-VE result for the sample collected around the playground area (SI-00022) was non-detect for LA asbestos and had no field-visible vermiculite. The field team did not sample in the play area due to 6 inches of gravel and fabric liner that covered the area of interest.

Visual inspections were conducted at historic soil sampling locations 1-02935, 1-02949, 1-02951, 1-02953, and 1-02955 (see Attachment C). These historic samples had results of either trace or <1% LA asbestos. Of these, only historic location 1-02953 had field-visible vermiculite observed (3-low out of 30 observations) during the June 2008 school inspections.

Libby Middle School

Inspection of the Libby Middle School was conducted on June 20, 2008, with oversight of excavation activities to repair a sprinkler on the football field conducted on June 24, 2008. A tour and access to the school was provided by Keith Ivers, assistant principal. Soil removal activities were previously conducted on the school grounds by the EPA emergency response teams in 2001.

Vermiculite was observed in two locations in the Yellow Wing of the school. In Room 501 (a science lab), one piece of vermiculite unexpanded (approximately 5 millimeters in diameter) was found beneath the easternmost sink along the south wall. This piece of vermiculite was disposed of as investigation-derived waste. There was no source area observed. In Room 505, there was a plastic planter pot containing soil with low amounts of unexpanded vermiculite. The locations where vermiculite was found are shown on page 4 of Attachment A. No vermiculite or VCI was observed along the exterior of the building.

One of the activities planned for the school inspections was to visually inspect and sample in areas of new construction (e.g., water line installation). During the tour with Mr. Ivers, he showed CDM personnel several locations where intrusive soil excavation work had been or will be conducted on the school grounds. The two areas that had been excavated were approximately 2 feet by 2 feet around two water faucets. There was no vermiculite observed and due to the limited size of the area, a soil sample was not collected. On June 24, 2008, CDM

conducted oversight of excavation activities implemented to repair a leaking sprinkler system. During this work, only one flake of vermiculite was observed and no sampling was deemed necessary. After the inspection, the EPA was contacted by a resident who identified vermiculite within a playground in the east yard area On July 10, 2008 a team re-visited the school playground area to investigate. A total of four soil samples were collected from the middle school grounds. Two samples were collected from the playground areas that were not part of the initial inspection. One sample was collected in the amphitheater which had been restored after our initial inspection. The other sample was collected from the area that was excavated on June 24th because there was more visible vermiculite observed. The results for these samples were all non-detect shown on Figure 1-2 in Attachment C.

Libby High School

Inspection of Libby High School was conducted on June 23, 2008. Access to the building was provided by Ken Lafont, a custodian at the school. During this initial inspection, the northwest wing (with Rooms 30-42) was not inspected because the floors were being waxed. This wing was inspected on July 21, 2008. Soil removal activities were previously conducted on the school grounds by the EPA emergency response teams in 2001.

Unexpanded vermiculite was observed beneath the wood floors and rocks in the two greenhouses, plastic flower pot bases in a store room east of the library, in seven potted plants being temporarily stored in the commons area, and two flakes were observed in outside soils at the northeast corner of the building. All locations where vermiculite was observed are shown on page 5 in Attachment A.

Both of the greenhouses have wood floors with gaps between the boards which allowed vermiculite and other materials to accumulate in the space below the floor. While the greenhouse adjacent to Rooms 29B and 29D appeared to have low levels of vermiculite, the greenhouse adjacent to Room 26B had moderate amounts of vermiculite located beneath the floor and amongst the rocks under the tables and shelves.)

The plastic pot bases in the store room next to the library have remnant VCS. The bases were stacked on a countertop in the southernmost of the store rooms east of the library. The pots associated with the bases were not located.

At the time of the inspection, 25 to 30 potted plants were being temporarily stored in the commons area of the school. Seven of the pots were identified as having VCS (the VCS level was low in five of the pots and moderate in 2 of the pots). The pots identified with VCS were marked with red duct tape.

After the two flakes of vermiculite were found outside the building at the northwest corner, a more intensive search for VCS was conducted in the immediate vicinity. No additional flakes of vermiculite were subsequently identified in this area.

Kootenai Head Start

Inspection of the Kootenai Head Start was conducted on June 24, 2008. Access to the building was provided by Louie Mysse, affiliation unknown, and Arnold Griener a custodian of the building. Unexpanded vermiculite at moderate levels was observed in two, five-gallon buckets of sand in a storage room south of the main gym area. One of the buckets had three toy shovels in it and a small quantity of this sand was spilled on the floor nearby. The buckets were marked with red duct tape. Vermiculite was also observed at low levels in the soil of a houseplant in the northwest office. These vermiculite locations are shown on page 6 in Attachment A. No VCI was observed in the interior or the exterior of the building during the inspection.

Table 1. Summary of Findings

School	VCI Observed	VCBM Observed	VCS Observed	PLM Soil Sample Results
Libby Administrative Building	No	Yes	NA to this investigation	NA to this investigation
Asa Wood Elementary	No – although know to exist in cinder block walls	Yes	Yes	2 – Trace (<0.2%) 17 – Non-detect
Libby Middle School	Yes	No	Yes	4 – Non-detect
Libby High School	Yes	No	Yes	NA to this investigation
Kootenai Head Start	No	No	Yes	NA to this Investigation

Notes: VCI – vermiculite containing insulation; VCBM – vermiculite containing building material; VCS – vermiculite containing soil; PLM – polarized light microscopy; NA – not applicable

Quality Assurance

Overall field QC sample collection frequency and data evaluation for the Libby Superfund Site is presented in the Draft Quality Assurance and Quality Control Summary Report for the

Libby Asbestos Superfund Site (2007). One soil sample duplicate was collected on June 19, 2008 (SI-00007).

Preliminary Air Sampling Zone Delineation

As part of the school inspections, the CDM field team delineated potential air sampling zones for future air sampling inside the buildings. Delineation of the preliminary air sampling zones considered the following general elements:

1) Whether a given area is populated primarily by students (e.g., classrooms) or faculty (e.g., administrative offices)

2) Physical features such as fire breaks or building wings

3) Room or area usage (e.g., metal shop vs. classroom)

4) Ceiling height (e.g., auditorium or gym vs. classrooms)

5) Other factors that could affect sample results including, but not necessarily limited to, the presence of sprayed on fireproofing, possible presence of VCBMs, dusty conditions (e.g., in a wood shop), etc.

The preliminary air sampling zones are shown on the maps in Attachment A. Data quality objectives should be considered in defining the quantity, size, and other characteristics of the air sampling zones. Some of the buildings appear to have multiple air sampling zones that would require sampling over the course of several days. It is envisioned that each zone would be initially characterized with a set of five air samples. Discussion of and the reasoning behind the preliminary zones is provided in the following sections.

Libby Administrative Building

Diagrams of the Libby Administrative Building are shown on pages 1 and 2 in Attachment A. In general, the large number of zones proposed for this building are, in part, to take into account the disparate groups of people who use and work in the building. The preliminary air sampling zones for the Libby Administrative Building are as follows:

Air Zone 1 - Basement (Libby Food Share). This zone was proposed due to its use in non-school related functions and the presence of the boiler/heating system.

Air Zone 2 - Little Theatre. Selected due to the unique use of the room, and the high ceilings in the theater.

Air Zone 3 - Board Room. The only room in the building with spray-on fireproofing above the drop ceiling.

Air Zone 4 - 1st Floor Hallway. High traffic area.

Air Zone 5 - Superintendent, Special Services, and Business Offices. Administrative staff area.

Air Zone 6 - 2nd Floor Hallway. High traffic area.

Air Zone 7 - 2nd Floor South. This zone consists of the four classrooms on the south side of the fire wall.

Air Zone 8 - 2nd Floor North. This zone consists of the recreation/storage room, early childhood learning center, a classroom, and offices north of the fire wall.

Asa Wood Elementary

A diagram of Asa Wood Elementary is shown on page 3 in Attachment A. The preliminary air sampling zones for Asa Wood are as follows:

Air Zone 1 - East Wing, North Section. A classroom wing. The boiler room is excluded from the sampling zone.

Air Zone 2 - Central Core Area, Excluding Gym/Stage. Administrative staff area.

Air Zone 3 - Gym/Stage. Selected due to the unique use of the room, the high ceilings, and presence of possible plaster VCBM.

Air Zone 4 - East Wing, South Section. A classroom wing.

Air Zone 5 - West Wing, Excluding Library. A classroom wing.

Air Zone 6 - Library. Possibly could include with Air Zone 5.

Consideration should be given to including the "Portable Lab" building in the sampling program. It was excluded from the current zone list since it is not frequented by children.

Libby Middle School

A diagram of Libby Middle School is shown on page 4 in Attachment A. Due to the size of the middle school, a large number of sampling zones are possible. In this case, it is suggested that air sampling be conducted in a small number of large zones and decide if further, more

detailed sampling is necessary based on these results. The preliminary initial air sampling zones a Libby Middle School are as follows:

Air Zone 1 - Offices and Library. Administrative staff area.

Air Zone 2 - Brown and Orange Wings. Classroom wings.

Air Zone 3 - Blue, Yellow, and Green Wings. Primarily classroom wings. Consideration should be given to sampling the Green Wing separately since usage is slightly different (i.e., art, industrial art, and home economics).

Air Zone 4 - Gym and Music Building. Separate from the main school building.

Libby High School

A diagram of Libby High School is shown on page 5 in Attachment A. Due to the presence of observed vermiculite and the size of the school, a large number of sampling zones is possible. The preliminary air sampling zones at Libby High School are as follows:

Air Zone 1 - Central area including counselor, nurse, Rooms 13-18, and Rooms 1 & 3. This is a transitional zone separating other zones.

Air Zone 2 - Commons, Food Service, and Library. Separate wing with different building details (e.g., high ceilings and open deck areas).

Air Zone 3 - North Wing (Rooms 21-29D plus greenhouses). Due to the vermiculite found in the greenhouses, special planning should be made when sampling this wing. Separate sampling of the individual greenhouses should be considered to help determine if contaminant contributions are being made to the main building areas.

Air Zone 4 - Northwest Wing (Rooms 30-42). A classroom wing.

Air Zone 5 - Band and Choir area. Distinct building structure with high ceilings.

Air Zone 6 - Front office, Principal office area, Room 2, open hallway, and custodian room. Administrative staff area.

Air Zone 7 - Includes metals/welding, laundry, athletic hallway, and athletic rooms within the wing north of the gym. Different room uses in this wing, but share the same general air space.

Air Zone 8 - Gym. Large unique structure that should be sampled separately.

Air Zone 9 - Auto/Wood Shop. Separate building.

Air Zone 10 (Optional) - Basement. Basement appears to be infrequently used, except for storage, and sampling it may be not necessary.

Kootenai Head Start

The diagram of the Kootenai Head Start building is shown on page 6 in Attachment A. Given that this building is the smallest of the buildings inspected, there are correspondingly fewer proposed air sampling zones. The preliminary air sampling zones at the Kootenai Head Start are as follows:

Air Zone 1 - Classroom Wing. Although room uses vary, all of the rooms are similarly constructed and share the same general air space.

Air Zone 2 - Gym and associated storage rooms. A separate air sampling zone due to high ceilings and presence of vermiculite in one of the storage room.

Conclusions and Recommendations

Overall, a minimal number of vermiculite-related sources were uncovered during the school inspections. A photographic log of these locations is provided in Attachment F. Within the limitations of the search and visual observation parameters outlined for this task, it appears evident that there are no major sources of vermiculite or VCI present in the living spaces of the school buildings inspected. However, follow up actions should be considered for the vermiculite observed at the following locations:

1) The two greenhouses at Libby High School

2) The vermiculite-contaminated sand found in buckets and spilled on the floor in the storage room at the Kootenai Head Start

3) The potted plants found at Libby High School (particularly those with those with moderate levels of VCS)

4) Planters with VCS, such as that found in the Yellow Wing at Libby Middle School and plastic bases in the storage room next to the Library at Libby High School

5) All potted plants with VCS in all the schools

Although the visual methods employed for these inspections was reasonably thorough, more intrusive inspection methods and detailed sampling of building materials would be required to ascertain the total extent of VCI and VCBM that may be present in the school buildings. For

example, intrusive methods and sampling of VCBM would be necessary to determine the extent of vermiculite-containing plasters and of VCI within the cells of cinder block walls.

To delineate the final air sampling zones, the purpose and objectives of the air sampling needs to be defined through the data quality objectives process.

Attachments

Attachment A - School Floor Plans with Visual Findings and Preliminary Air Sampling Zones

Attachment B - Field Logbook Notes

Attachment C - Asa Wood Elementary Historic and New Sample Locations

Attachment D - Field Sample Data Sheets for Soil Samples Collected at Asa Wood Elementary in June 2008

Attachment E - PLM-VE Sample Results for Soil Samples Collected at Asa Wood Elementary in June 2008

Attachment F - Photo Log

cc: Steve Losier - Volpe Center
Courtney Zamora- Volpe Center
Dee Warren - CDM Denver
Project Files - CDM Denver

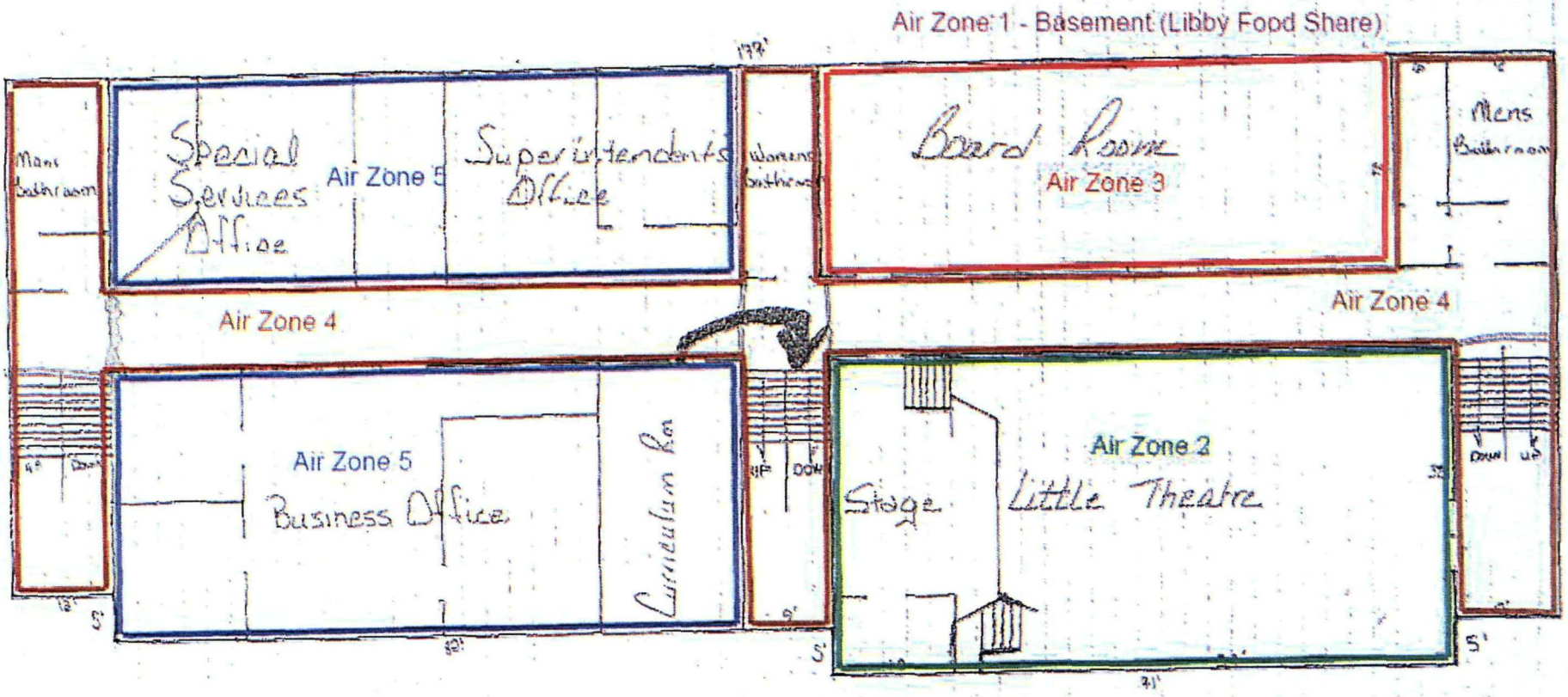
Attachment A

School Floor Plans with Visual Findings and Preliminary Air Sampling Zones

Central Building

1st Floor

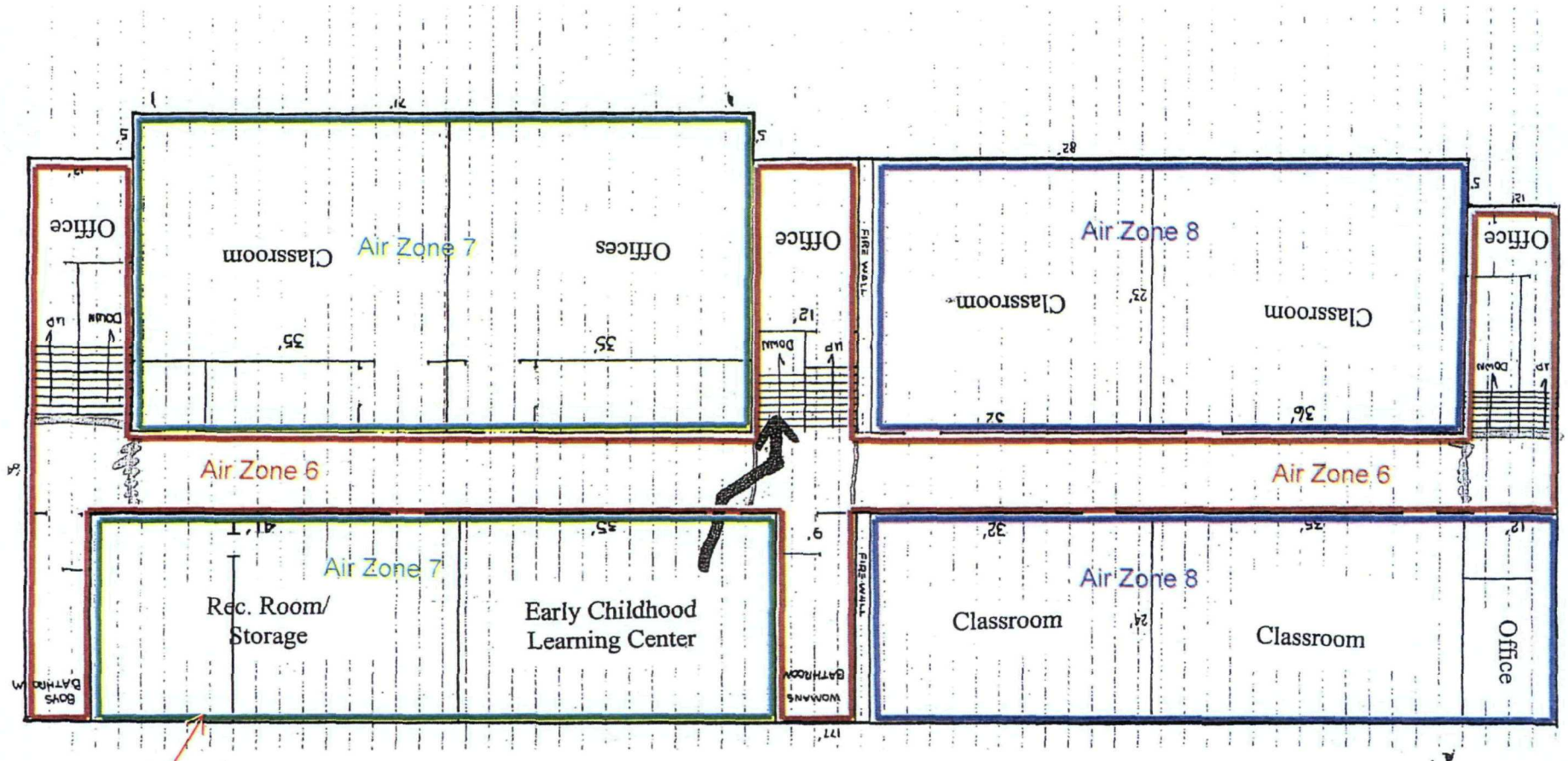
24288
56 5t



Emergency Escape Plan

Central Building

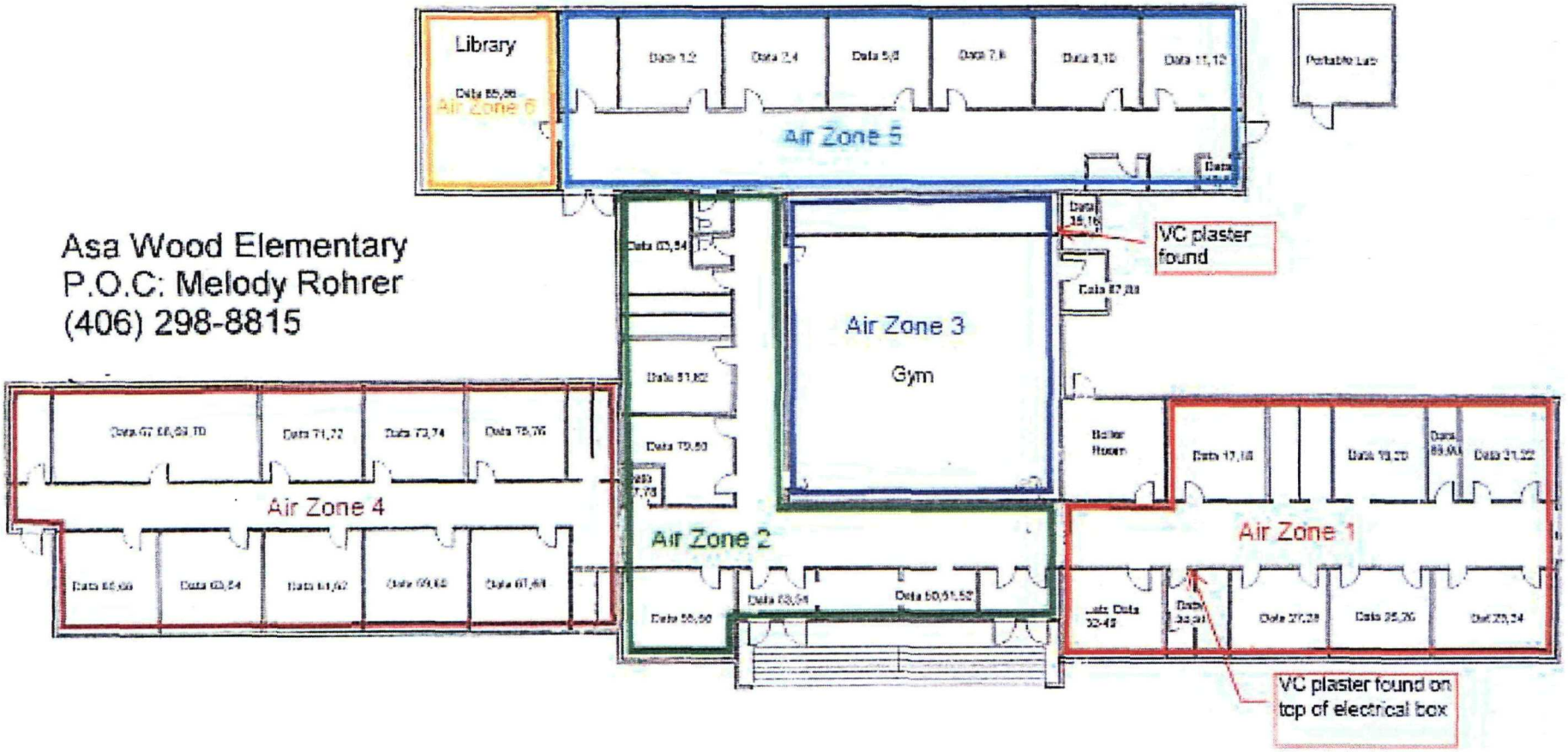
2nd Floor



Emergency Escape Plan

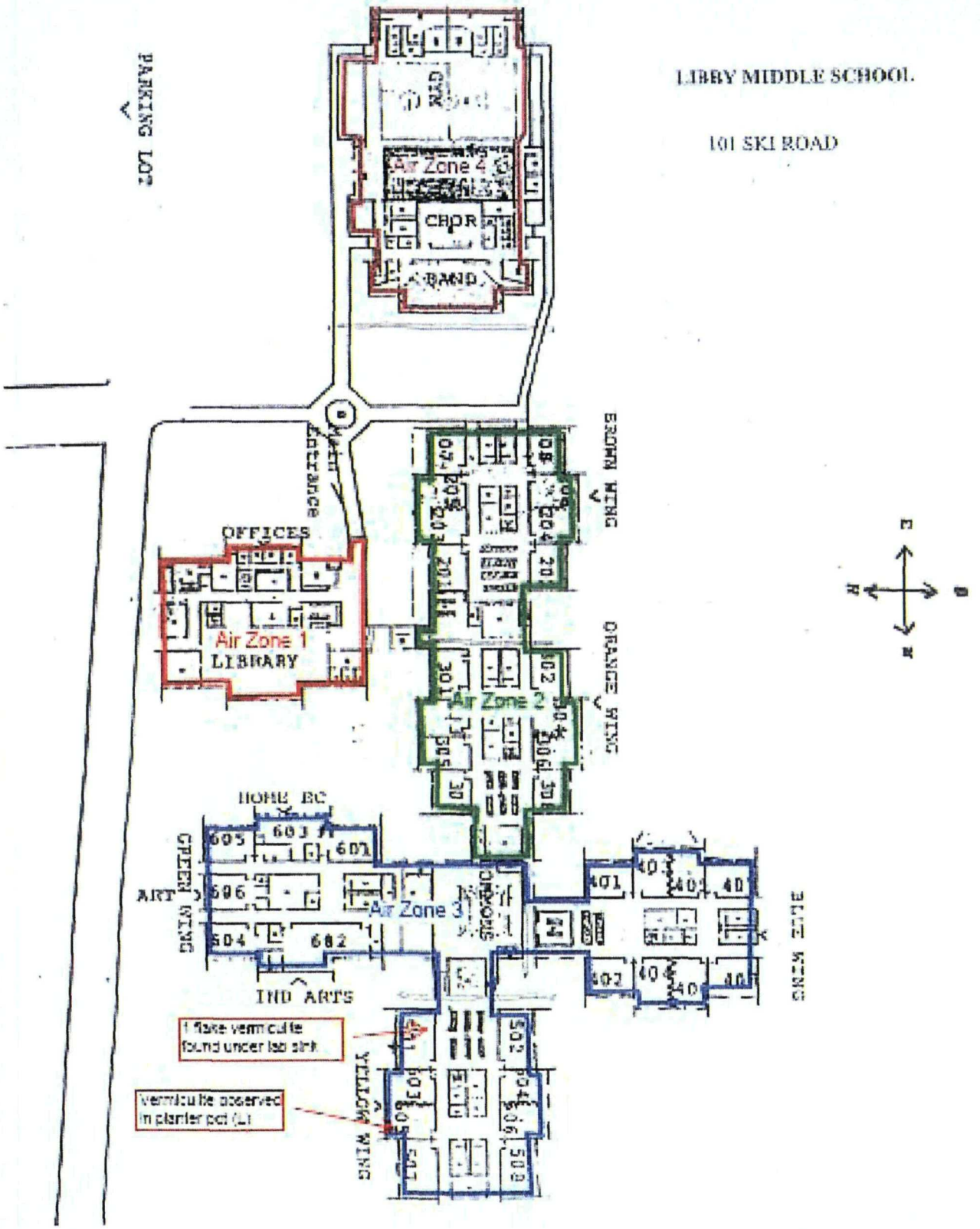
DCS Direct Communications Systems, Inc.
106 Cooperative Way Suite 100
Kalispell, MT 59901

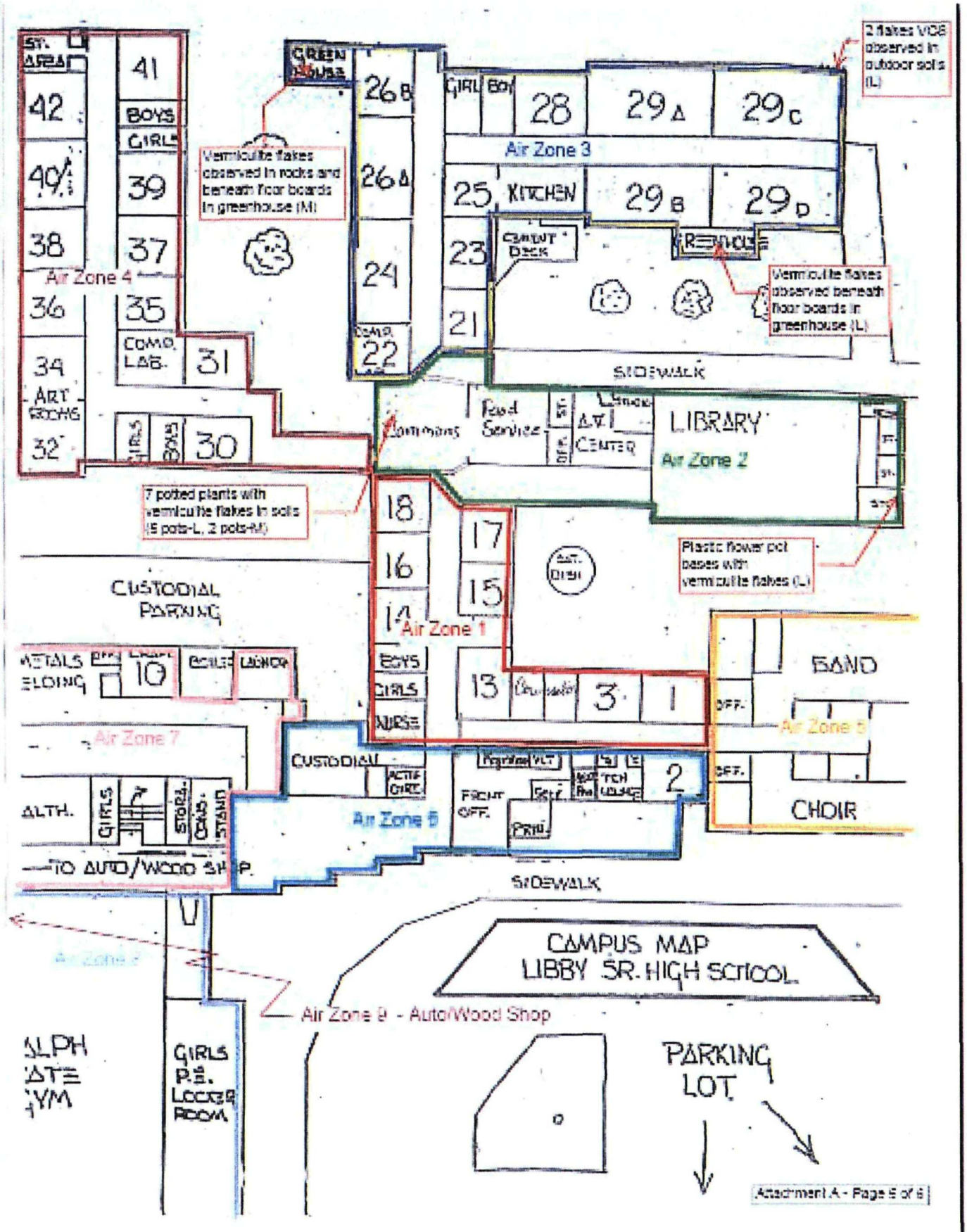
Asa Wood Elementary
P.O.C: Melody Rohrer
(406) 298-8815



LIBBY MIDDLE SCHOOL

101 SKI ROAD



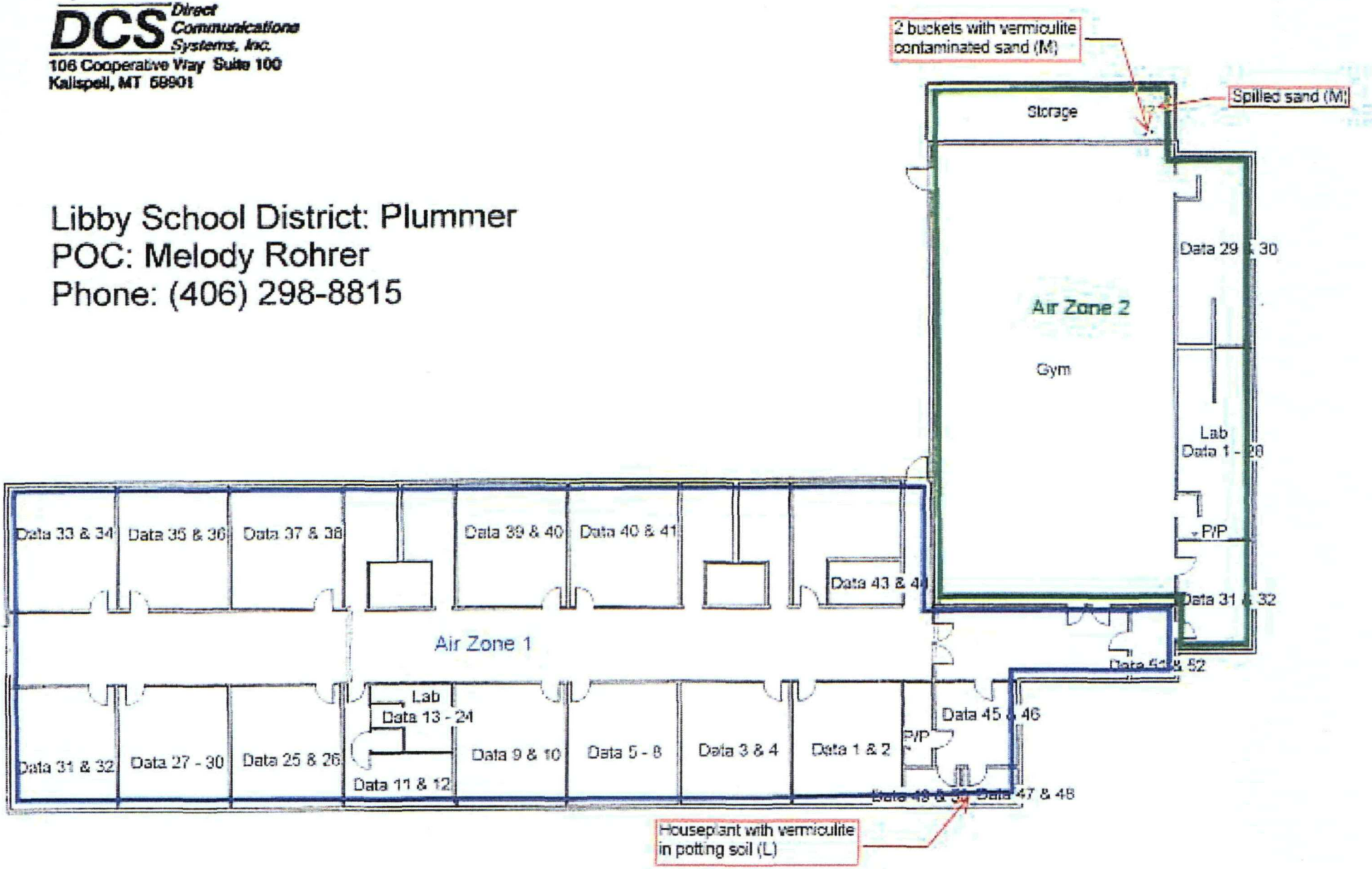

2 flakes VCB observed in outdoor soils (L)
Vermiculite flakes observed in rocks and beneath floor boards in greenhouse (M)
Vermiculite flakes observed beneath floor boards in greenhouse (L)
7 potted plants with vermiculite flakes in soils (5 pots-L, 2 pots-M)
Plastic flower pot bases with vermiculite flakes (L)
Air Zone 1
Air Zone 2
Air Zone 3
Air Zone 4
Air Zone 5
Air Zone 6
Air Zone 7
Air Zone 8
Air Zone 8 - Auto/Wood Shop
LIBRARY
SIDEWALK
CUSTODIAL PARKING
BAND
CHOIR
CAMPUS MAP
LIBBY SR. HIGH SCHOOL
PARKING LOT
GIRLS P.E. LOCKER ROOM
TO AUTO/WOOD SHOP
Attachment A - Page 5 of 6

DCS Direct Communications Systems, Inc.
106 Cooperative Way Suite 100
Kalispell, MT 59901

Libby School District: Plummer

POC: Melody Rohrer

Phone: (406) 298-8815



Attachment B

Field Logbook Notes

101012

"Outdoor writing products for outdoor writing people."

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"Rite in the Rain" - A unique All-Weather Writing paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather.

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6 32281 30111 0

"Rite in the Rain"®
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TRANSIT

LIBBY ASBESTOS PROJECT

School Investigation

6/18/08 to _____

Libby Asbestos Project
CDM Contractor Logbook

Return to:
Paul Lammers
60 Port Boulevard, Suite 201
Libby, MT 59923
406-293-8595

Every Page:

- Logbook number, initial and date every page, sign and date last entry of the day. Line out once, initial and date all changes. NO blank lines.

Daily Entries

- Author, date & time, weather, activities, persons on team, level of PPE, title of governing document.

~~RAWP=Final Draft Response Action Work Plan, April 2007~~
~~PDIWP=Final Draft Pre-Design Inspection Activities Work Plan, November 2003~~

Residential Removal Oversight Equipment List:

Small shovel, 4x6 and 9x12 poly sample bags, 5 gallon buckets, radio, cell phone, camera, SKC low flow air pumps, high flow air pumps, Rotometer, 20" box fan, 1-HP leaf blower, air pump stands, tygon tubing, 0.8 um PCM cassettes, GFIC splitters, soil probes.

Air Clearance Procedures:

Prior to sampling a 1-hp leaf blower will be used to blow down the sample area. Air sampling pumps will be pre- and post-calibrated. During sampling, a 20" box fan will be placed in the center of the sampling area facing the ceiling, running on high.

GIRA-General Information for Response Action.

CONTENTS

Volpe/Libby Asbestos Project Logbook # 101012
Date: 6-18-08 PPE: Level D Weather: 65°F, sunny
Address: 724 Louisiana Ave Owner: Libby Public Schools
Personnel: S. Wilson, C. Roland, B. Alexander (all CDM)
Author: S. Wilson
All activities conducted in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008

0805 Inspection team onsite. Also onsite D. Pisciotta (CDM) and K. Repine (CDM)

0810 Conduct Health and Safety walkthrough of site (exterior and interior)

0818 Begin interview with superintendent of schools, K. Maki.

0820 D. Pisciotta, K. Repine offsite.

0850 Finish interview with K. Maki, start indoor inspection and outdoor inspection.

0926 Finish outdoor inspection, no VCBM or VCI found.

Notes from meeting with K. Maki - no reports in recent times from janitors, teachers, etc of VCBM or VCI. Libby Middle School (101 Ski Rd), Libby High School (150 Education Way) and Libby Administrative Building (724 Louisiana Ave) used to have pipe wrap, taken out years ago. No VCI in block walls. Libby Middle school and Libby High school used to have vermiculite in soil. Removals have taken place in the past.

For ASA Woods Elementary School (700 Idaho Ave) and

S. Wilson 6-18-08

724 Louisiana Ave owner: Libby Public Schools 6-18-08

Head Start (247 Indian Head Rd - formerly Plummer Elementary) there is VCI in the block walls. Because of S. Wilson 6-18-08 addid additions, former exterior walls are now interior walls.

1050 Finished inspecting basement. No visible VCBM/VCI

1110 Offsite

1150 Inspection team back onsite, inspecting first floor.

1330 Finish inspecting first floor. Possible VCI in closet of mens bathroom, in the pipe chase. Start inspecting second floor.

1445 D. Repine (CDM) onsite to discuss possible vermiculite in plaster, in storage space in Rec. Room (2nd floor). Determined to be possible VCBM

1510 D. Repine offsite.

1545 finish upstairs inspection, 2nd floor. Unable to access Room 4, in the offices section, opposite Early Childhood Learning Center Room. That was the only room not accessed.

1550 Inspection team offsite back to office.

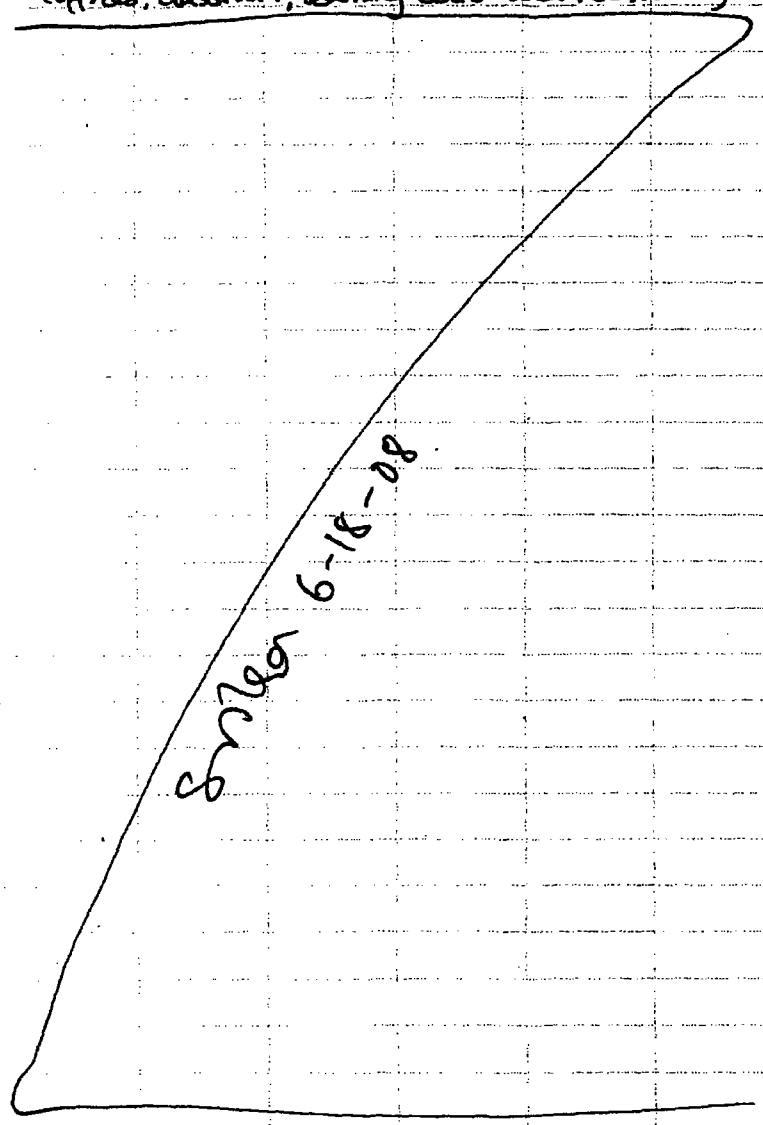
Notes: TSI observed in basement. Suggested air sampling zones: 1. Basement (Libby Food share area) 2. little theatre 3. board room 4. 1st floor hallway 5. Superintendent, special services and business office 6. 2nd floor hallway 7. 2nd floor south (4 classrooms) 8. 2nd floor north

S. Wilson 6-18-08

4 Volpe/Libby Asbestos Project Logbook 101012

724 Louisiana Ave owner: Libby Public Schools 6-18-08

(offices, classroom, learning center and rec. room)



5

Volpe/Libby Asbestos Project Logbook # 101012

Date: 6/19/08 PPE: Level D Weather: Sunny, 55°F

Address: 700 Idaho Ave. Owner: Libby Public Schools

Personnel: K. Repine, C. Roland, S. Wilson, B. Alexander (all CDM)

Author: B. Alexander

All activities conducted in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008

RAA 6/19/08

0855 Met with Mr. Maki (Libby School Superintendent) at 0830 this morning and he introduced us to Tony Snyder (janitor) at Asa Wood Elementary. Mr. Snyder's phone number is 293-1225. Also, K. Repine and S. Wilson are on the Asa Wood school grounds conducting soil sampling. C. Roland and I are conducting the interior inspections for vermiculite at the north end of the east wing. RAA 6/19/08

1209 C. Roland and I have completed inspections of the east wing of Asa Wood school. No definate findings of vermiculite have been made. However, possible vermiculite may present in the wall plaster in a few locations and, using the Provision Scope, vermiculite may be present in a wall opening behind the door in the southernmost store room of the east wing. We will go over these possibilities with Damon Repine later. RAA 6/19/08

1234 S. Wilson reports that he is little under halfway done with the soil sampling. Adam Smith (CDM) on-site helping

Robert Alexander 6/19/08

6 6/19/08 Libby School Inspections - Asa Wood
EPA/Volpe Logbook #01012 700 Louisiana Ave.

1507 We have completed the interior and exterior inspection at Asa Wood. Damon Repine (CDM) was on-site and checked a couple of locations with us. We determined that NO loose pieces of vermiculite were observed in the building. NO vermiculite appeared to be present in the wall opening discussed earlier. There were two locations where vermiculite was observed in plaster materials: 1) Reading coach room (Room 8, east wing) - plaster pieces w/vermiculite were found on top of an electrical box next to the room entrance and 2) wall plaster next to the electrical boxes at the side of the stage on north side.

1552 The following potential air sampling zones are proposed: 1) East Wing, north section — APA 6/19/08
2) Central core, excluding gym / ~~theater~~/stage
3) Gym/stage area
4) East wing, south section
5) West wing, excluding library
6) Library

S. Wilson and crew have completed collection of following soil samples:

- SI-00001, SI-00002, and SI-00003 on FSDS S-005630
- SI-00004 and *SI-00006 on FSDS No. S-005631
- SI-00007*, SI-00009, and SI-00010 on FSDS No. S-005632
- SI-00011, SI-00012*, and SI-00014 on FSDS No. S-005633
- SI-00016, SI-00017, and SI-00018 on FSDS No. S-005634
- SI-00019, SI-00020, and SI-00021 on FSDS No. S-005637

Libby School Inspections Logbook #/01012 6/19/08 7
Asa Wood - 700 Louisiana Ave, EPA/Volpe

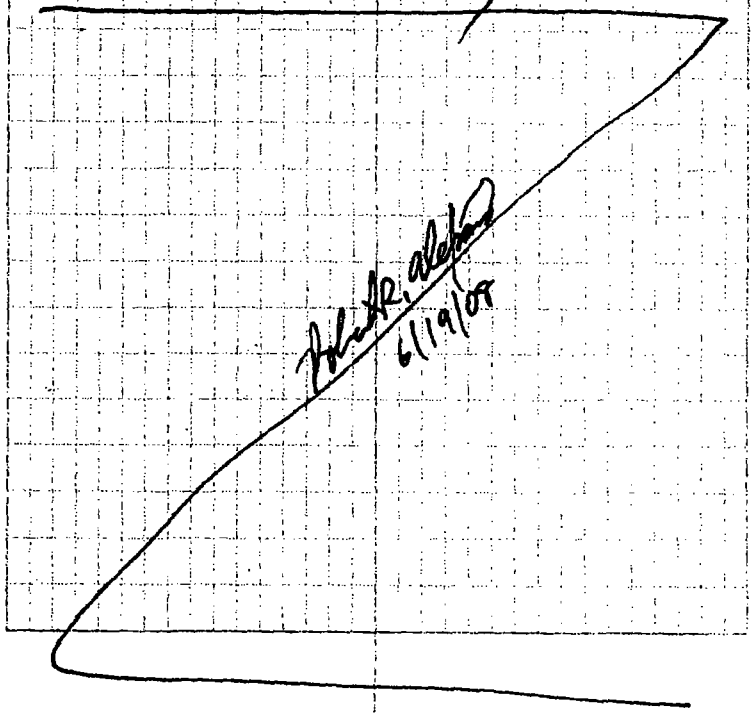
SI-00022 on FSDS No. S-005638.

Note: SI-00005, SI-00008, and SI-00013 were voided per direction of Tommy Cook (CDM).

1714 S. Wilson reports that only some visual soil inspections and GPS of soil sample locations remain to be done at Asa Wood. Left site.

1730 K. Repine (CDM) provided the following BD number for Asa Wood School:

BD-005603 6/19/08



Volpe/Libby Asbestos Project Logbook # 101012
Date: 6/20/08 PPE: Level D Weather: Sunny, 60°F
Address: 101 Ski Road Owner: Libby Public Schools
Personnel: R. Alexander, S. Wilson, C. Roland, A. Smith (all CDM)
Author: R. Alexander
All activities conducted in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008

1030 At 0830 this morning, we met up Keith Ivers, assistant principal at Libby Middle school. He gave us tour of the building, then we set out to inspect the gymnasium/music building. No vermiculite was observed in the gym/music building. Mr. Ivers also pointed several locations outside where new spigots had been installed (2 locations), the location of the amphitheatre which is about to be renovated, a location on the football field where a sprinkler leak is about to be fixed, and pointed out several places where fence posts were removed. Mr. Ivers thought we might check these. Meanwhile, C. Roland and A. Smith have completed inspecting the office area with no vermiculite observed. RRA 6/20/08

1230 Returned to Libby Middle School after eating lunch. The inspection team has completed checking the library

Brown Wing, Orange Wing, and Green Wing with no Vermiculite observed in any of these areas. At the Green Wing, some holes in the girls bathroom were scoped, but no vermiculite was observed. Note that S. Wilson and Adam Smith are now going to go over to Aga & Wood to finish their outdoor soil work. RRA 6/20/08

1518 Have completed inspection of Common Area, Yellow Wing, and Blue Wing. No vermiculite was observed in the Common Area and Blue Wing. In the Yellow Wing, vermiculite was observed in two locations. In Room 501 (a science lab), one piece of vermiculite (5 mm in diameter) was found beneath the east-most sink along the south wall. In Room 505, a plastic planter pot has soil in it some vermiculite flakes. RRA 6/20/08

1549 C. Roland completed exterior inspection of Libby Middle School. No VCI leaks from walls were observed.

1554 The following potential air sampling zones are proposed: 1) Offices and Library
2) Brown and Orange Wings
3) Blue, Yellow, and Green Wings
4) Gym and Music Building

1602 Left Libby Middle School

Robert E. Alexander 6/20/08

Volpe/Libby Asbestos Project Logbook # 101012
Date: 6/20/08 PPE: Level D Weather: Sunny, 75°F
Address: 700 Idaho Ave Owner: Libby Public Schools
Personnel: S. Wilson, A. Smith (both CDM)
Author: R. Alexander (CDM)
All activities conducted in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008

RPA 6/20/08

1640 Spoke with S. Wilson to get a summary of his activities today at the Asa Wood School. He and Adam Smith arrived at Asa Wood after helping C. Roland and me with the interior inspection at Libby Middle School. They did 30-point visual inspections at the following historic sampling sites: 1-02949 (30-X), 1-02955 (30-X), 1-02935 (30-X), 1-02953 (27-X, 3-L). He said that yesterday they visually inspected 1-02951 (30-X). Thus, in sum, only historic location 1-02953 had any vermiculite observed. He also collected the GPS information for the samples collected yesterday (6/19/08) (see pages 6 and 7). The GPS filename is T2A06208. He said he was on site at 1230 and left at 1450.

Roberta Alexander 6/20/08

Volpe/Libby Asbestos Project Logbook # 101012
Date: 6/23/08 PPE: Level D Weather: Sunny, 60°F
Address: Libby High School 160 Education Way Owner: Libby Public School
Personnel: R. Alexander, C. Roland, S. Wilson, A. Smith (all CDM)
Author: R. Alexander
All activities conducted in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008

0842 Met up with Ken Lafont (283-1208), custodian at Libby High School. Had S. Wilson and A. Smith start in the "greenhouse" wing. C. Roland and me start in library area. RPA 6/23/08 RPA 6/23/08

0941 C. Roland & I found some vermiculite flakes on some flower pot bases in the southeast library storage room. Also, S. Wilson observed a few flakes in the planter box beneath the flooring of the greenhouse south of Room 29B and 29D. RPA 6/23/08

1019 C. Roland and I find moderate amount of vermiculite in greenhouse attached to Room 26B. RPA 6/23/08

1122 In the common area, house plants are being stored temporarily. 7 of these plants had vermiculite in their soil (6-L, 2-M) and marked with red duct tape.

1225 Returned to high school after eating lunch.

1557 Have completed the interior and exterior inspections. The only additional vermiculite found was 2 flakes of

Roberta Alexander 6/23/08

12 6/23/08 Libby School Inspections EPA/Volpe
Logbook #101012 Libby High School - 150 Education Way
vermiculite found in exterior soils at the northeast corner of the school building. Left the Libby High School grounds. 1653 The following potential air sampling zones are proposed:

1) Central core that includes the ~~principal office area~~, front office, counselor, nurse, and Rooms 13-18, and Rooms 1 & 3.
2) Commons, food service, A.V. center, and library.
3) Wing consisting of rooms 21-29D.
4) Wing consisting of Rooms 30-42.
5) Band and choir area.
6) Front office, principal office area, Room 2, open hallway, activities, and custodian room.
7) Wing including metals/welding, laundry, athletic hallway, and "ALTH."
8) Main gym area, locker rooms, weightroom, and misc. 2nd floor rooms.
9) Auto/wood shop.
10) Optional basement area accessed from custodian room.

Robert Alexander 6/23/08

13

Volpe/Libby Asbestos Project Logbook # 101012
Date: 6/24/08 PPE: Level D Weather: Sunny, 60°F
Address: 247 Indian Head Rd. (Kootenai Head Start) Owner: Libby Public Schools
Personnel: R. Alexander, C. Roland (both CDM)
Author: R. Alexander
All activities conducted in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008

0935 Arrived at Head Start, but no one was here at the building. Had C. Roland begin exterior inspection.
0940 Returned. R. Alexander returns to Head Start. C. Roland reports no findings during the exterior inspection.
0946 Received call from K. Repine (CDM). Someone is on their way to open the Head Start building.
1132 Have completed the inspection. Doors were opened for us by Louie Myrse (293-1247) (not sure of his affiliation). Janitor Arnold Gruener also arrived at the building at about 0945. Arnold's number is 293-3602303.
Vermiculite was observed in two buckets of sand in a storage room south of the main gym area. Toy shovels were found in one of the buckets. Also, a small amount of this sand was spilled on the floor nearby. The buckets were labeled with red tape and photos of them taken.

6/24/08 Libby School Inspections EPA/Volpe Logbook #101012
Kootenai Head Start - 247 Indian Head Road

1142 Left head start grounds for lunch. RAA 6/24/08

1244 The following potential air sampling zones are proposed:

1) East Wing including office area and hallway in front of gym
2) Gym including south storage area and west rooms.

1325 I also need to note that a houseplant with low levels of vermiculite was found in the northwest office (11 Data 47 & 48). Left site.

Robert H. Alexander 6/24/08

Volpe/Libby Asbestos Project Logbook # **101012**

Date: 6/24/08 PPE: Level D Weather: Sunny, 70°F

Address: 101 Ski Road (Libby Middle School) Owner: Libby Public Schools

Personnel: S. Wilson (CDM)

Author: R. Alexander (CDM)

All activities conducted in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008

1349 S. Wilson relayed me the following notes regarding his work this morning at Libby Middle School: RAA 6/24/08

0905 On-site. Meet with R. Goodman (Principal) (Principal). Walk with him around the site. Wait for contractor P. Spencer.

0940 Call P. Spencer. Won't be on-site till 1015, Leave site

1015 On site. Contractor already present. Had stripped off turf around planned excavation area and started to excavate.

1039 See one flake visible vermiculite. Call D. Repine (CDM). Says carry on.

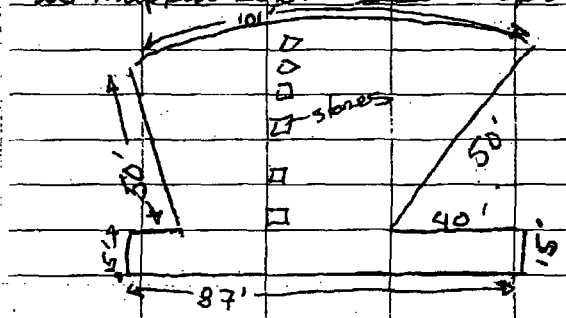
1100 D. Repine onsite.

1105 D. Repine offsite.

1148 Finished excavating. P. Spencer goes to get supplies to fix broken pipe. Offsite back to office. No photos taken. No samples taken.

Robert H. Alexander 6/24/08

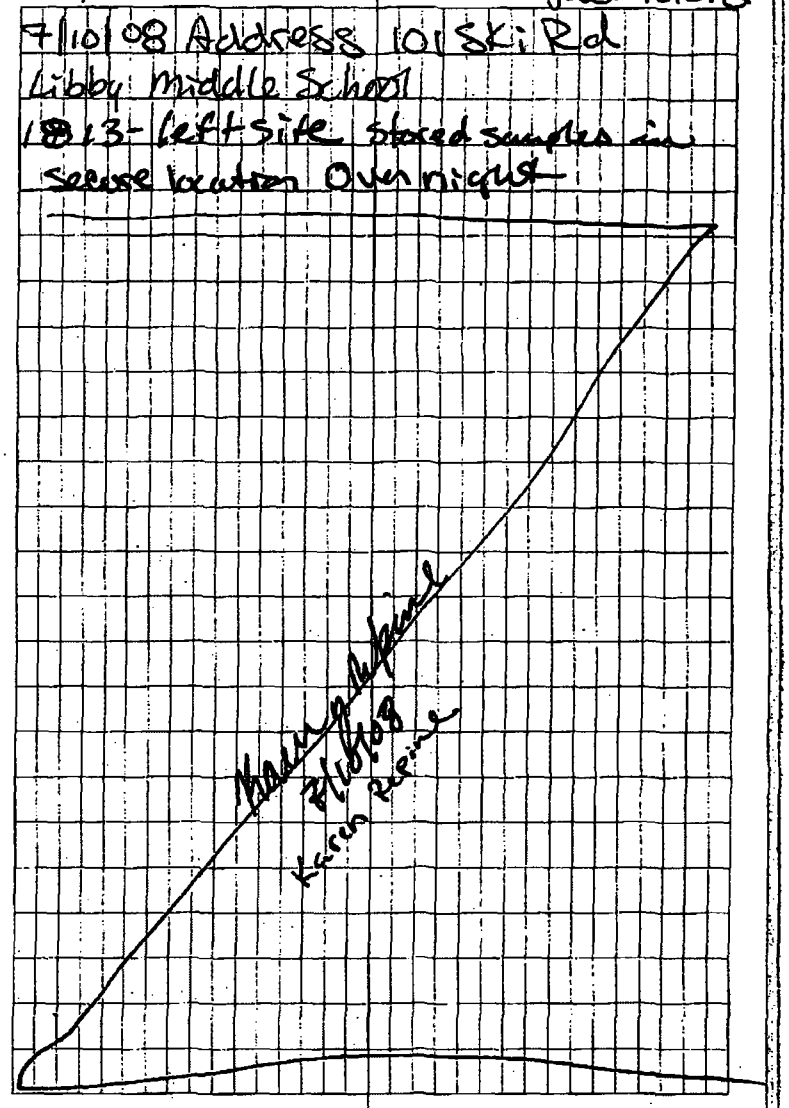
7/10/08 PPE: Level D Weather Sunny 85°F windy
Address 101 Ski Rd Libby Middle School
Personnel: K. Zepine A. Smith & C. Roland
CCDm) Author K. Zepine All activities performed in accordance with Final Tech Memorandum Libby Public School Inspection June 17, 2008
1632 Arrived on site to perform Soil Sampling Sampled Amphitheater 30 point Composite Area to be sampled is mapped below.



SI-00023 Collected Sample at 1658
SI-00024 started Sampling at 1659.
SI-00025 started Sampling at 1705
Reference FSDS S-05814 GPS Points Collected.
SI-00026 started at 1755-

Karen Zepine

7/10/08 Address 101 Ski Rd Libby Middle School
1813- left site stored samples in secure location Overnight



Volpe/Libby Asbestos Project Logbook# 101012

Date: 7/21/08 PPE level D Weather: Sunny, 90°F

Address: Libby High School, 160 Education Way Owner: Libby Public Schools

Personnel: S. Wilson, C. Roland (both CDM)

Author: C. Roland

All activities conducted in accordance with Final Tech Memorandum Libby Public Schools Inspection June 17, 2008

1335 - Inspection team arrives on site, S. Wilson and C. Roland (CDM), CR Weather at the Libby high school, to finish inspection of the Northwestern wing.

Note: The inspection team had arrived on site earlier on 6/23/08 to conduct a complete visual inspection of interior and exterior of the Libby High school grounds. The Northwestern wing of the high school had its floors waxed earlier that morning and so inspection of that area was postponed till the area was ready for inspection.

1345 Inspection team conducted Health and Safety walkthrough of the interior of the Northwestern wing.

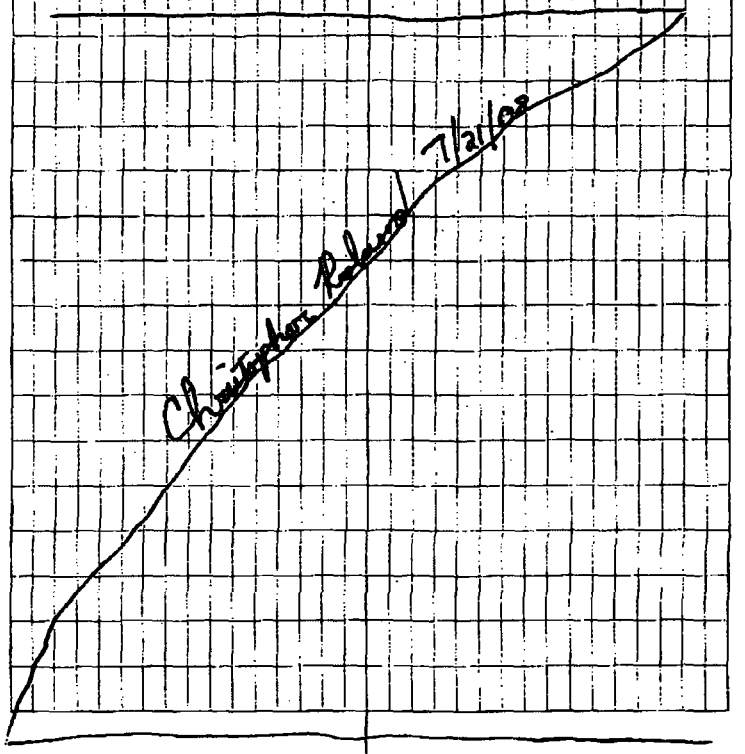
LATE ENTRY: Janitor unlocks all doors to the Northwestern wing and sets them to lock again when closed. (1340)

7/21/08 Christopher Roland

1350 Inspection Team begins visual inspection of the Northwestern wing of the Libby High School

1445 Visual Inspection is completed and no visibal Vermiculite is found.

1450 Inspection Team is off site.



Attachment C

Figures of 2008 Sampling Locations


SI-00002
SI-00001
SI-00021
SI-00003
SI-00022
SI-00020
SI-00004
SI-00019
SI-00007
SI-00006
SI-00018
SI-00009
SI-00010
SI-00017
SI-00016
SI-00016
SI-00011
SI-00014
SI-00012
N
W
E
S
Feet
0
50
100
200
1 inch equals 100 feet
Legend
Results %
< 1%
TR
ND
Parcels
Asa Wood Elementary
700 Idaho Avenue
Libby, Montana
SAMPLING LOCATIONS
Figure 1-1
CDM
Document Path:\\Denver\Libby\GIS\070320_700_Idaho_Ave.mxd

Feet

0 150 300 450

1 inch equals 150 feet

Legend

Soil Samples

Non-detect

Libby Middle School
101 Ski Road
Libby, Montana

Sampling Locations
Figure 1-2

CDM

Document: R:\2603-Volpe\Libby\GIS\Fig_X-X_Soils_101_SkiRd_080724.mxd

Attachment D

Field Sample Data Sheets for Soil Samples Collected

Sheet No.: S- 005630

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 5-7 Sampling Date: 6/19/08

Address: 700 Idaho Ave (Owner/Tenant: Libby Public Schools

Business Name: Asa Wood Elementary

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: Wilson K. Paine

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00001	SI- 00002	SI- 00003
Location ID	SP- 137278	SP- 137279	SP- 137295
Sample Group	Park	Park	Park
Location Description (circle)	(Back yard) Front yard Side yard Driveway (Other) N. E corner of truck	(Back yard) Front yard Side yard Driveway (Other) N. Corner of track	(Back yard) Front yard Side yard Driveway (Other) N. Corner of track
Category (circle)	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	(Surface Soil) Other _____	(Surface Soil) Other _____
Type (circle)	Grab Comp. # subsamples 30	Grab Comp. # subsamples 30	Grab Comp. # subsamples 30
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T2A06208 NA	Filename: T2A06208 NA	Filename: T2A06208 NA
Sample Time	0920	0910	0950
Top Depth (inches below ground surface)	0	0	0
Bottom Depth (inches below ground surface)	~~2~~ SW 6-19-08 3	~~2~~ SW 6-19-08 3	3
Field Comments *Note if vermiculite is visible in sampled area*	BD- 005603 no visible vermiculite observed	BD- 005603 no visible vermiculite observed.	BD- 005603 visible 29-X, 1-L
Entered (LFO)	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____

For Field Team Completion (Provide Initials)	Completed by: SW	QC by:

vs 10507

Sheet No.: S- 005631

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 5-7 Sampling Date: 6/19/08

Address: Amended 6/19/08 700 Idaho Ave (Owner) Tenant: Libby Public Schools

Business Name: Asa Wood Elementary

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: S. Wilson & K. Repine

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00004	SI- 00005 (Rev 6-19-08)	SI- 00006
Location ID	SP- 137296	SP- 137297 (Rev 6-19-08)	SP- 137298
Sample Group	park		park
Location Description (circle)	Back yard Front yard (Side yard) Driveway (Other) W. corner of track	Back yard Front yard Side yard Driveway Other _____	Back yard Front yard (Side yard) Driveway (Other) W. side of track
Category (circle)	(FS) FD of _____ EB LB	(FS) FD of 6-19-08 EB LB	(FS) FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	(Surface Soil) Other _____	(Surface Soil) Other _____
Type (circle)	Grab (Comp.) # subsamples 30	Grab (Comp.) # subsamples 30	Grab (Comp.) # subsamples 30
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T2A06208 NA	Filename: _____ NA	Filename: T2A06208 NA
Sample Time	1030		1110
Top Depth (inches below ground surface)	0		0
Bottom Depth (inches below ground surface)	3		3
Field Comments *Note if vermiculite is visible in sampled area*	BD- 005603 Visible 29-Y, 1-L	BD- _____	BD- 005603 No visible 30-X
Entered (LFO)	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____

For Field Team Completion (Provide Initials)	Completed by: SW	QC by:

vs 10507

Sheet No.: S- 005632

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 5-7 Sampling Date: 6/19/08

Address: 700 Idaho Ave (Owner/Tenant: Libby Public Schools)

Business Name: Asa Wood Elementary

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: S. Wilson, A. Smith

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00007 SW 6-19-08	SI- 00009 SW 6-19-08	SI- 00010 SW 6-19-08
Location ID	~~SP- 137298~~ SP- 137299	SP- 137400	SP- 137401
Sample Group	park	park	park
Location Description (circle)	Back yard Front yard (Side yard) Driveway (Other) W. side of track	Back yard Front yard (Side yard) Driveway (Other) S.W. corner of track	Back yard (Front yard) Side yard Driveway (Other) S. side of track
Category (circle)	~~FS~~ SW 6-19-08 (FD) of SI-00006 EB LB	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	(Surface Soil) Other _____	(Surface Soil) Other _____
Type (circle)	Grab (Comp.) # subsamples 30	Grab (Comp.) # subsamples 30	Grab (Comp.) # subsamples 30
GPS Status (circle)	Collected Previously Collected Not Collected-no signal (3 attempts) (Not Collected-not required for sample)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: _____ (NA)	Filename: T2A06208 NA	Filename: T2A06208 NA
Sample Time	1140	1205	1321
Top Depth (inches below ground surface)	0	0	0
Bottom Depth (inches below ground surface)	3	3	3
Field Comments *Note if vermiculite is visible in sampled area*	BD- 005603 No visible 30-X	BD- 005603 No visible 30-X	BD- 005603 Visible 29-X, 1-L
Entered (LFO) CB	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____

For Field Team Completion (Provide Initials)	Completed by: SW	QC by:

vs 10507

Sheet No.: S- 005633

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 5-7 Sampling Date: 6-19-08

Address: 700 Idaho Ave. Owner/Tenant: Libby Public Schools

Business Name: Asa Wood Elementary

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: S. Wilson, A. Smith

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00011 SV 6-19-08	SI- 00012 SV 6-19-08	SI- 00014 SV 6-19-08
Location ID	SP- 137402	SP- 137403	SP- 137404
Sample Group	park	park	park
Location Description (circle)	Back yard (Front yard) Side yard Driveway Other S. side of track	Back yard (Front yard) Side yard Driveway Other S. e. side of track	Back yard (Front yard) Side yard Driveway Other S. e side of track
Category (circle)	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	(Surface Soil) Other _____	(Surface Soil) Other _____
Type (circle)	Grab (Comp) # subsamples 30	Grab (Comp) # subsamples 30	Grab (Comp) # subsamples 30
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T2A06208 NA	Filename: T2A06208 NA	Filename: T2A06208 NA
Sample Time	1330	1355	1350
Top Depth (inches below ground surface)	0	0	0
Bottom Depth (inches below ground surface)	3	3	3
Field Comments *Note if vermiculite is visible in sampled area*	BD- 005603 VISIBLE 29-X, 1-L	BD- 005603 VISIBLE 29-X, 1-L	BD- 005603 No visible 30-X
Entered (LFO)	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____

For Field Team Completion (Provide Initials)	Completed by: SW	QC by:

vs 10507

Sheet No.: S- 005634

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 5-7 Sampling Date: 6-19-08

Address: 700 Idaho Ave (Owner/Tenant: Libby Public Schools

Business Name: Asa Wood Elementary

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: S. Wilson, A. Smith

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00016 (6-19-08)	SI- 00017 (6-19-08)	SI- 00018 (6-19-08)
Location ID	SP- 137405 (6-19-08)	SP- 137406 (6-19-08)	SP- 137407 (6-19-08)
Sample Group	park	park	park
Location Description (circle)	Back yard (Front yard) Side yard Driveway Other E. side of track	Back yard (Front yard) Side yard Driveway Other E. side of track	Back yard Front yard (Side yard) Driveway Other N. E side of track
Category (circle)	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	(Surface Soil) Other _____	(Surface Soil) Other _____
Type (circle)	Grab (Comp) # subsamples 30	Grab (Comp) # subsamples 30	Grab (Comp) # subsamples 30
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T2A06208 NA	Filename: T2A06208 NA	Filename: T2A06208 NA
Sample Time	1425	1430	1512
Top Depth (inches below ground surface)	0	0	0
Bottom Depth (inches below ground surface)	3	3	3
Field Comments *Note if vermiculite is visible in sampled area*	BD- 005603 No visible 30-X	BD- 005603 No visible 30-X	BD- 005603 No visible 30-X
Entered (LFO)	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____

For Field Team Completion (Provide Initials)	Completed by: SW	QC by:

vs 10507

Sheet No.: S- 005637

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 5-7 Sampling Date: 6-19-08

Address: 700 Idaho Ave (Owner/Tenant: Libby Public Schools)

Business Name: Asa Wood Elementary

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: S. Wilga, A. Smith, C. Roland

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00019 SC 6-19-08	SI- 00020 SC 6-19-08	SI- 00021 SC 6-19-08
Location ID	SP- 137408	SP- 137409	SP- 137410
Sample Group	park	park	park
Location Description (circle)	Back yard Front yard (Side yard) Driveway (Other) N.E side of track	Back yard Front yard (Side yard) Driveway (Other) N.E side of track	Back yard Front yard (Side yard) Driveway (Other) N.E side of track
Category (circle)	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	(Surface Soil) Other _____	(Surface Soil) Other _____
Type (circle)	Grab (Comp.) # subsamples 30	Grab (Comp.) # subsamples 30	Grab (Comp.) # subsamples 30
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T2A06208 NA	Filename: T2A06208 NA	Filename: T2A06208 NA
Sample Time	1518	1550	1610
Top Depth (inches below ground surface)	0	0	0
Bottom Depth (inches below ground surface)	3	3	3
Field Comments *Note if vermiculite is visible in sampled area*	BD- 005603 No visible 30-X	BD- 005603 No visible 30-X	BD- 005603 No visible 30-X
Entered (LFO)	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____

For Field Team Completion (Provide Initials)	Completed by: SW	QC by:

vs 10507

Sheet No.: S- 005638

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 5-7 Sampling Date: 6-19-08

Address: 700 Idaho Avenue (Owner/Tenant: Libby Public Schools

Business Name: Asa Woods Elementary

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: S. Wilson

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00022		
Location ID	SP- 137411		
Sample Group	park		
Location Description (circle)	Back yard Front yard (Side yard) Driveway (Other) new play area	Back yard Front yard Side yard Driveway Other _____	Back yard Front yard Side yard Driveway Other _____
Category (circle)	(FS) FD of _____ EB LB	FS FD of _____ EB LB	FS FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	Surface Soil Other _____	Surface Soil Other _____
Type (circle)	Grab (Comp.) # subsamples 30	Grab Comp. # subsamples _____	Grab Comp. # subsamples _____
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T2AD6208 NA	Filename: _____ NA	Filename: _____ NA
Sample Time	1635		
Top Depth (inches below ground surface)	0		
Bottom Depth (inches below ground surface)	3		
Field Comments *Note if vermiculite is visible in sampled area*	BD- 005603 no visible 30-X	BD- _____	BD- _____
Entered (LFO)	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____

For Field Team Completion (Provide Initials)	Completed by: SW	QC by:

vs 10507

Sheet No.: S- 005814

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 16-17 Sampling Date: 7/10/08

Address: 101 Ski Rd (Owner/Tenant: Libby Public Schools)

Business Name: Libby Middle School

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team (CDM) Other _____ Names: K. Repine, A. Smith & C. Roland

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00023	SI- 00024	SI- 00025
Location ID	SP- 137880	SP- 137881	SP- 137882
Sample Group	Yard	Play Area	Play Area
Location Description (circle)	(Back yard) Front yard Side yard 7/10/08 Driveway mr Other ~~Ampho~~	Back yard Front yard (Side yard) Driveway Other	Back yard Front yard (Side yard) Driveway Other
Category (circle)	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB	(FS) FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other	(Surface Soil) Other	(Surface Soil) Other
Type (circle)	Grab (Comp) # subsamples 30	Grab (Comp) # subsamples 30	Grab (Comp) # subsamples 30
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T2B07108 NA	Filename: T2B07108 NA	Filename: T2B07108 NA
Sample Time	1648	mr 7/10/08 1745	1746
Top Depth (inches below ground surface)	0	0	0
Bottom Depth (inches below ground surface)	3	6	6
Field Comments *Note if vermiculite is visible in sampled area*	BD- AD-000198 1-L 29-x mr 7/10/08 No visible vermiculite observed in one location.	BD- AD-000198 2-L VCS observed 28-x	BD- AD-000198 3-L VCS observed. 27-x
Entered (LFO) VS	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____

For Field Team Completion (Provide Initials)	Completed by:	QC by: KM

vs 10507

Sheet No.: S- 005815

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR SOIL

Field Logbook No: 101012 Page No: 16-17 Sampling Date: 7/10/08

Address: 101 Ski Rd (Owner/Tenant: Libby Public Schools)

Business Name: Libby Middle School

Land Use: Residential (School) Commercial Mining Roadway Other ( )

Sampling Team: (CDM) Other _____ Names: C. Roland, A. Smith, & K. Repine

Data Item	Sample 1	Sample 2	Sample 3
Index ID	SI- 00026		
Location ID	SP- 137883		
Sample Group	Yard		
Location Description (circle)	Back yard Front yard (Side yard) Driveway Other Track Field	Back yard Front yard Side yard Driveway Other _____	Back yard Front yard Side yard Driveway Other _____
Category (circle)	(FS) FD of _____ EB LB	FS FD of _____ EB LB	FS FD of _____ EB LB
Matrix Type (Surface soil unless other wise noted)	(Surface Soil) Other _____	Surface Soil Other _____	Surface Soil Other _____
Type (circle)	Grab (Comp. # subsamples 30)	Grab Comp. # subsamples ____	Grab Comp. # subsamples ____
GPS Status (circle)	(Collected) Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample
GPS File (fill in or circle)	Filename: T25307108 NA	Filename: _____ NA	Filename: _____ NA
Sample Time	1805		
Top Depth (inches below ground surface)	0		
Bottom Depth (inches below ground surface)	3		
Field Comments *Note if vermiculite is visible in sampled area*	BD- AD-000198 1-L 29-X	BD- _____	BD- _____
Entered (LFO) DS	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____	Volpe: Entered ____ Validated ____

For Field Team Completion (Provide Initials)	Completed by:	QC by: KM

vs 10507

Attachment E

Polarized Light Microscopy – Visual Estimation (PLM-VE) Sample Results for Soil Samples Collected June and July 2008

PLM Results for Soil Samples

Asa Wood Elementary - 700 Idaho Ave		
Index ID	Date Collected	Sample Result
SI-00001	6/19/2008	ND
SI-00002	6/19/2008	ND
SI-00003	6/19/2008	ND
SI-00004	6/19/2008	TR
SI-00006	6/19/2008	ND
SI-00007	6/19/2008	ND
SI-00009	6/19/2008	ND
SI-00010	6/19/2008	ND
SI-00011	6/19/2008	ND
SI-00012	6/19/2008	ND
SI-00014	6/19/2008	ND
SI-00016	6/19/2008	ND
SI-00017	6/19/2008	TR
SI-00018	6/19/2008	ND
SI-00019	6/19/2008	ND
SI-00020	6/19/2008	ND
SI-00021	6/19/2008	ND
SI-00022	6/19/2008	ND

Middle School - 101 Ski Rd		
Index ID	Date Collected	Sample Result
SI-00023	7/10/2008	ND
SI-00024	7/10/2008	ND
SI-00025	7/10/2008	ND
SI-00026	7/10/2008	ND

Attachment F

Photo Log

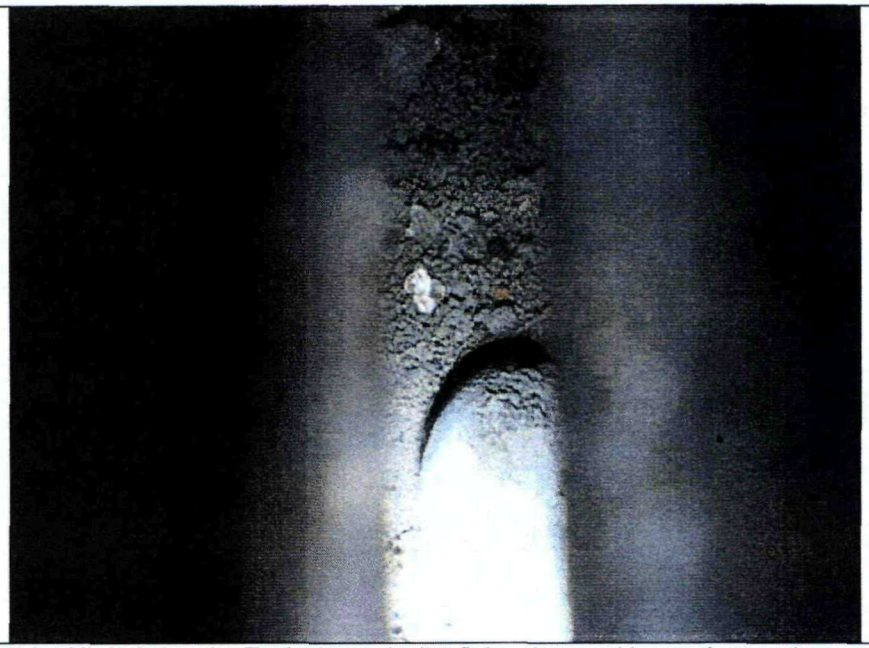
Asa Wood Elementary School - Part of new playground area, June 2008. No visible vermiculite was observed and PLM-VE results were non-detect.

Libby Middle School – Room 501 in the Yellow Wing, June 2008. One flake of vermiculite approximately 5mm in diameter was found.

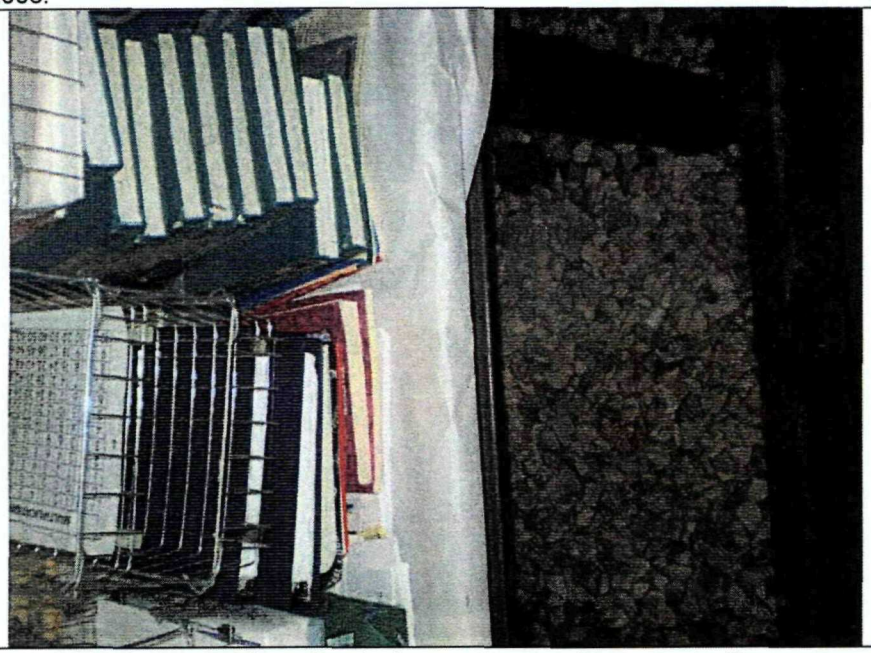
Libby High School – Plant temporarily stored in Commons area with low levels of observed vermiculite, June 2008.

Libby High School – Plant temporarily stored in Commons area with moderate levels of observed vermiculite, June 2008 (image rotated to fit page).

Libby High School – View of floor boards typical in the greenhouses, June 2008.



Libby High School – Typical vermiculite flake observed beneath greenhouse floorboards, June 2008.



Libby High School – View of rocks in greenhouse where vermiculite was observed, June 2008 (image rotated to fit page).

Libby High School – Plastic flower pot bases with remnant vermiculite observed located in store room east of the Library, June 2008.

Kootenai Head Start – Two buckets of sand with moderate levels of vermiculite observed in store room south of gym, June 2008.

Kootenai Head Start – Spilled sand with moderate levels of vermiculite observed in store room south of gym, June 2008.

Note: Since there were no confirmed findings of vermiculite were made, no photos at the Libby Administrative Building are included in this log.

APPENDIX B
STANDARD OPERATING PROCEDURES
(provided electronically)

SOP Description	SOP ID
Sample Custody	CDM SOP 1-2, with modification
Packaging and Shipping of Environmental Samples	CDM SOP 2-1, with modification
Guide to Handling of Investigation-Derived Waste	CDM SOP 2-2, with modification
Field Logbook Content and Control	CDM SOP 4-1, with modification
Photographic Documentation of Field Activities	CDM SOP 4-2, with modification
Field Equipment Decontamination at Nonradioactive Sites	CDM SOP 4-5, with modification
Control of Measurement and Test Equipment	CDM SOP 5-1
Standard Operating Procedure (SOP) for the Sampling of Asbestos Fibers in Air	EPA-LIBBY-01 Rev. 1

Project-Specific Modification

SOP No.: 1-2

SOP Title: Sample Custody

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: _____ Date: 5/7/03

Technical Reviewer: _____ Date: 5/7/03

QA Reviewer: _____ Date: 5/12/03

EPA Approval: _____ Date: 5/19/03

NOTE: Each media (soil/dust) must be submitted on separate COC forms.

The sample coordinator assistant will use the FSDS to complete an electronic chain of custody (eCOC). The sample coordinator will check the data entered to create the eCOC against the FSDSs. Three paper copies of the eCOC will then be generated. One copy will be filed in the CDM Libby office and the other two will be sent with the samples. The sample coordinator will then check the eCOC versus the sample containers and sample shipment. The sample coordinator will be responsible for shipment of samples. If any errors are found on an eCOC after shipment, the paper copy of the COC will be corrected by the sample coordinator with a single strikeout initial and date. The corrected copy will be faxed to Volpe and the laboratory. The fax to Volpe will be used to update the Libby project database.

Reason for and duration of modification: Sample custody procedures for the Libby asbestos project vary slightly from SOP 1-2. These modifications are necessary for the entire duration of the project.

Project-Specific Modification

Via: Hand delivery or shipped. Hand delivery refers to samples delivered by hand to the onsite laboratory; shipped refers to samples sent to the laboratory by delivery service (i.e., Federal Express). To be completed by the sample coordinator.

Project: All samples collected in accordance with this sampling and analysis plan (SAP) are part of the CSS. Circle CSS. To be completed by the field team.

Sample Placed in Cooler/Bag: Refers to visual confirmation of the sample in the shipping container. To be completed by the sample coordinator.

Index ID: Unique index identification number used to identify sample, in the form CSS-#####. To be completed by the field team.

Sample Date: The date each sample was collected, in the form MM/DD/YY. To be completed by the field team.

Sample Time: The time each sample was collected, in military time. To be completed by the field team.

Sample Matrix: The matrix of each sample collected, specific to the CSS; S = soil and W = water. To be completed by the field team.

Sample Type: Sample type of each sample collected; G = grab, C = composite. To be completed by the field team.

Volume: Specific to air and dust samples. Does not pertain to the CSS. "NA" should be placed in this field. To be completed by the field team.

Analysis Request: Analysis of each sample collected. All soil samples will be analyzed by IR. IR will be written in the analysis request portion of the COC form by the field team. The sample coordinator and/or laboratory coordinator may request SEM analysis based on Table 5-2 of the SAP. The sample coordinator and/or laboratory coordinator will designate IR for the appropriate samples.

Comments: Any pertinent information regarding the sample (i.e., vermiculite visible) will be entered by either the field team or the sample coordinator.

Sample Received by Lab: To be checked by the sample custodian at the laboratory upon receipt of the samples to confirm presence of each sample on the COC record.

Project-Specific Modification

Total Number of Samples: Total number of samples on the COC form. To be completed by the field team.

Additional Comments: Any additional comments that relate to samples on the COC form (i.e., turn around times). To be completed by the field team or sample coordinator.

Relinquished by: (1) Signed by field team member that relinquishes samples to sample coordinator and company of person relinquishing samples to sample coordinator (i.e., CDM). Date of relinquish shall be in the form MM/DD/YY and time shall be in military time. (2) Additional relinquished by lines to be completed following standard sample custody procedures.

Received by: (1) Signed by sample coordinator that receives samples from the sampling team and company of person accepting samples from the field teams (i.e., CDM). Date and time of acceptance should be the same as date and time of relinquish. (2) Additional received by lines to be completed following standard sample custody procedures.

Sample Condition upon Receipt: Will reflect the condition of samples at the relinquish time (i.e., accept ok or not acceptable with an explanation). To be completed by the person receiving samples.

Page ___ of ___: Sequential page number of the entire COC set sent to the laboratory. To be completed by the sample coordinator.

Sample Custody

SOP 1-2
Revision: 5
Date: March 2007

Prepared: David O. Johnson

Technical Review: S. Budney

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt

QA Review: Jo Nell Mullins

Approved:

Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt

Issued:

Signature/Date

1.0 Objective

Because of the evidentiary nature of samples collected during environmental investigations, possession must be traceable from the time the samples are collected until their derived data are introduced as evidence in legal proceedings. To maintain and document sample possession, sample custody procedures are followed. All paperwork associated with the sample custody procedures will be retained in CDM Federal Programs Corporation (CDM) files unless the client requests that it be transferred to them for use in legal proceedings or at the completion of the contract.

Note: Sample custody documentation requirements vary with the specific EPA region or client. This SOP is intended to present basic sample custody requirements, along with common options. Specific sample custody requirements shall be presented in the project-specific quality assurance (QA) project plan or project-specific modification or clarification form (see Section U-1).

2.0 Background

2.1 Definitions

Sample - A sample is material to be analyzed that is contained in single or multiple containers representing a unique sample identification number.

Sample Custody - A sample is under custody if:

1. It is in your possession
2. It is in your view, after being in your possession
3. It was in your possession and you locked it up
4. It is in a designated secure area

Chain-of-Custody Record - A chain-of-custody record is a form used to document the transfer of custody of samples from one individual to another.

Custody Seal - A custody seal is a tape-like seal that is part of the chain-of-custody process and is used to detect tampering with samples after they have been packed for shipping.

Sample Label - A sample label is an adhesive label placed on sample containers to designate a sample identification number and other sampling information.

Sample Tag - A sample tag is attached with string to a sample container to designate a sample identification number and other sampling information. Tags may be used when it is difficult to physically place adhesive labels on the container (e.g., in the case of small air sampling tubes).

3.0 General Responsibilities

Sampler - The sampler is personally responsible for the care and custody of the samples collected until they are properly transferred or dispatched.

Field Team Leader - The field team leader (FTL) is responsible for ensuring that strict chain-of-custody procedures are maintained during all sampling events. The FTL is also responsible for coordinating with the subcontractor laboratory to

ensure that adequate information is recorded on custody records. The FTL determines whether proper custody procedures were followed during the fieldwork.

Field Sample Custodian - The field sample custodian, when designated by the FTL, is responsible for accepting custody of samples from the sampler(s) and properly packing and shipping the samples to the laboratory assigned to do the analyses. A field sample custodian is typically designated only for large and complex field efforts.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP).

4.0 Required Supplies

- Chain-of-custody records (applicable client or CDM forms)
- Sample labels and/or tags
- EPA Field Operations Records Management System II Lite™ (FORMS II Lite™) software (if required)
- Printer paper
- Custody seals
- Clear tape
- Computer
- Printer

5.0 Procedures

5.1 Chain-of-Custody Record

This procedure establishes a method for maintaining custody of samples through use of a chain-of-custody record. This procedure will be followed for all samples collected or split samples accepted.

Field Custody

1. Collect only the number of samples needed to represent the media being sampled. To the extent possible, determine the quantity and types of samples and sample locations before the actual fieldwork. As few people as possible shall handle samples.

2. Complete sample labels or tags for each sample using waterproof ink.

3. Maintain personal custody of the samples (in your possession) at all times until custody is transferred for sample shipment or directly to the analytical laboratory.

Transfer of Custody and Shipment

1. Complete a chain-of-custody record for all samples (see Figure 1 for an example of a chain-of-custody record. Similar forms may be used when requested by the client). When transferring the possession of samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer from the sampler, often through another person, to the sample custodian in the appropriate laboratory.

    - The date/time will be the same for both signatures when custody is transferred directly to another person. When samples are shipped via common carrier (e.g., Federal Express), the date/time will not be the same for both signatures. Common carriers are not required to sign the chain-of-custody record.

    - In all cases, it must be readily apparent that the person who received custody is the same person who relinquished custody to the next custodian.

    - If samples are left unattended or a person refuses to sign, this must be documented and explained on the chain-of-custody record.

Note: If a field sample custodian has been designated, he/she may initiate the chain-of-custody record, sign, and date as the relinquisher. The individual sampler(s) must sign in the appropriate block, but does (do) not need to sign and date as a relinquisher (refer to Figure 1).

2. Package samples properly for shipment and dispatch to the appropriate laboratory for analysis. Each shipment must be accompanied by a separate chain-of-custody record. If a shipment consists of multiple coolers, a chain-of-custody record shall be filled out for each cooler documenting only samples contained in that particular cooler.

3. The original record will accompany the shipment, and the copies will be retained by the FTL and, if applicable, distributed to the appropriate sample coordinators. Freight bills will also be retained by the FTL as part of the permanent documentation. The shipping number from the freight bill shall be recorded on the applicable chain-of-custody record and field logbook in accordance with TSOP 4-1, *Field Logbook Content and Control*.

Procedure for Completing CDM Example Chain-of-Custody Record
The following procedure is to be used to fill out the CDM chain-of-custody record. The record provided herein (Figure 1) is an example chain-of-custody record. If another type of custody record (i.e., provided by the EPA Contract Laboratory Program (CLP) or a subcontract laboratory or generated by FORMS II Lite™) is used to track the custody of samples, the custody record shall be filled out in its entirety.

1. Record project number.
2. Record FTL for the project (if a field sample custodian has been designated, also record this name in the “Remarks” box).
3. Record the name and address of the laboratory to which samples are being shipped.
4. Enter the project name/location or code number.
5. Record overnight courier’s airbill number.
6. Record sample location number.
7. Record sample number.
8. Note preservatives added to the sample.
9. Note media type (matrix) of the sample.
10. Note sample type (grab or composite).
11. Enter date of sample collection.
12. Enter time of sample collection in military time.
13. When required by the client, enter the names or initials of the samplers next to the sample location number of the sample they collected.
14. List parameters for analysis and the number of containers submitted for each analysis.
15. Enter appropriate designation for laboratory quality control (e.g., matrix spike/matrix spike duplicate [MS/MSD], matrix spike/duplicate [MS/D]), or other remarks (e.g., sample depth).
16. Sign the chain-of-custody record(s) in the space provided. All samplers must sign each record.
17. If sample tags are used, record the sample tag number in the “Remarks” column.
18. The originator checks information entered in Items 1 through 16 and then signs the top left “Relinquished by” box, prints his/her name, and enters the current date and time (military).
19. Send the top two copies (usually white and yellow) with the samples to the laboratory; retain the third copy (usually pink) for the project files. Retain additional copies for the project file or distribute as required to the appropriate sample coordinators.
20. The laboratory sample custodian receiving the sample shipment checks the sample label information against the chain-of-custody record. Sample condition is checked and anything unusual is noted under “Remarks” on the chain-of-custody record. The laboratory custodian receiving custody signs in the adjacent “Received by” box and keeps the copy. The white copy is returned to CDM.

5.2 Sample Labels and Tags

Unless the client directs otherwise, sample labels or tags will be used for all samples collected or accepted for CDM projects.

1. Complete one label or tag with the information required by the client for each sample container collected. A typical label or tag would be completed as follows (see Figure 2 for example of sample tag; labels are completed with the equivalent information):

    - Record the project code (i.e., project or task number).
    - Enter the station number (sample number or EPA CLP identification number) if applicable.
    - Record the date to indicate the month, day, and year of sample collection.
    - Enter the time (military) of sample collection.

- Place a check to indicate composite or grab sample.
- Record the station (sample) location.
- Sign in the space provided.
- Place a check next to "yes" or "no" to indicate if a preservative was added.
- Place a check under "Analyses" next to the parameters for which the sample is to be analyzed. If the desired analysis is not listed, write it in the empty slot. Note: Do not write in the box for "laboratory sample number."
- Place or write additional relevant information under "Remarks."

2. Place adhesive labels directly on the sample containers. Place clear tape over the label to protect from moisture.

3. Securely attach sample tags to the sample bottle. On 2.27 liter (80 oz.) amber bottles, the tag string may be looped through the ring-style handle and tied. On all other containers, it is recommended that the string be looped around the neck of the bottle, then twisted, and relooped around the neck until the slack in the string is removed.

4. Double-check that the information recorded on the sample tag is consistent with the information recorded on the chain-of-custody record.

5.3 Custody Seals

Two custody seals must be placed on opposite corners of all shipping containers (e.g., cooler) before shipment. The seals shall be signed and dated by the shipper.

Custody seals may also be required to be placed on individual sample bottles. Check with the client or refer to EPA regional guidelines for direction.

5.4 Sample Shipping

CDM Federal SOP 2-1, *Packaging and Shipping Environmental Samples* defines the requirements for packaging and shipping environmental samples.

6.0 Restrictions/Limitations

Check with the EPA region or client for specific guidelines. If no specific guidelines are identified, this procedure shall be followed.

For EPA CLP sampling events, combined chain-of-custody/traffic report forms generated with EPA FORMS II Lite™ or other EPA-specific records may be used. Refer to regional guidelines for completing these forms.

The EPA FORMS II Lite™ software may be used to customize sample labels and custody records when directed by the client or the CDM project manager.

7.0 References

U. S. Army Corps of Engineers. 2001. *Requirements for the Preparation of Sampling and Analysis Plan*, EM 200-1-3. Appendix F. February.

U. S. Environmental Protection Agency. Revised March 1992. *National Enforcement Investigations Center, Multi-Media Investigation Manual*, EPA-330/9-89-003-R. p.85.

_____. Region IV. 1996. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*. Section 3.3. May.

_____. 2002. *FORMS II Lite™ User's Guide, Version 5.1*.

_____. 2002. *EPA Guidance for Quality Assurance Project Plans*, EPA QA/G-5, EPA/240/R-02/009. Section 2.2.3. December.

_____. 2004. *Contract Laboratory Program (CLP), Guidance for Field Samplers,* EPA-540-R-00-003. Final. Section 3.2. August.

Figure 1
Example CDM Chain-of-Custody Record

CDM

125 Maiden Lane, 5th Floor
New York, NY 10038
(212) 785-9123
Fax: (212) 785-6114

CHAIN OF CUSTODY RECORD

PROJECT ID.	FIELD TEAM LEADER	LABORATORY AND ADDRESS	DATE SHIPPED
PROJECT NAME/LOCATION		LAB CONTRACT:	AIRBILL NO.

MEDIA TYPE	PRESERVATIVES	SAMPLE TYPE
1. Surface Water	1. HCl, pH <2	G = Grab
2. Groundwater	2. HNO3, pH <2	C = Composite
3. Leachate	3. NaOH, pH >12	
4. Field QC	4. H2SO4, pH <2	
5. Soil/Sediment	5. Zinc Acetate, pH >9	
6. Oil	6. Ice Only	
7. Waste	7. Not Preserved	
8. Other _____	8. Other _____	

SAMPLE LOCATION NO.	LABORATORY SAMPLE NUMBER	PRESER-VATIVES ADDED	MEDIA TYPE	SAMPLE TYPE	20_ _ DATE	TIME SAMPLED	ANALYSES (List no. of containers submitted)								REMARKS (Note if MS/MSD)
1.															
2.															
3.															
4.															
5.															
6.															
7.															
8.															
9.															
10.															

SAMPLER SIGNATURES:

RELINQUISHED BY: (PRINT)	DATE/TIME	RECEIVED BY: (PRINT)	DATE/TIME	RELINQUISHED BY: (PRINT)	DATE/TIME	RECEIVED BY: (PRINT)	DATE/TIME
(SIGN)		(SIGN)		(SIGN)		(SIGN)	
RELINQUISHED BY: (PRINT)	DATE/TIME	RECEIVED BY: (PRINT)	DATE/TIME	RELINQUISHED BY: (PRINT)	DATE/TIME	RECEIVED BY: (PRINT)	DATE/TIME
(SIGN)		(SIGN)		(SIGN)		(SIGN)	

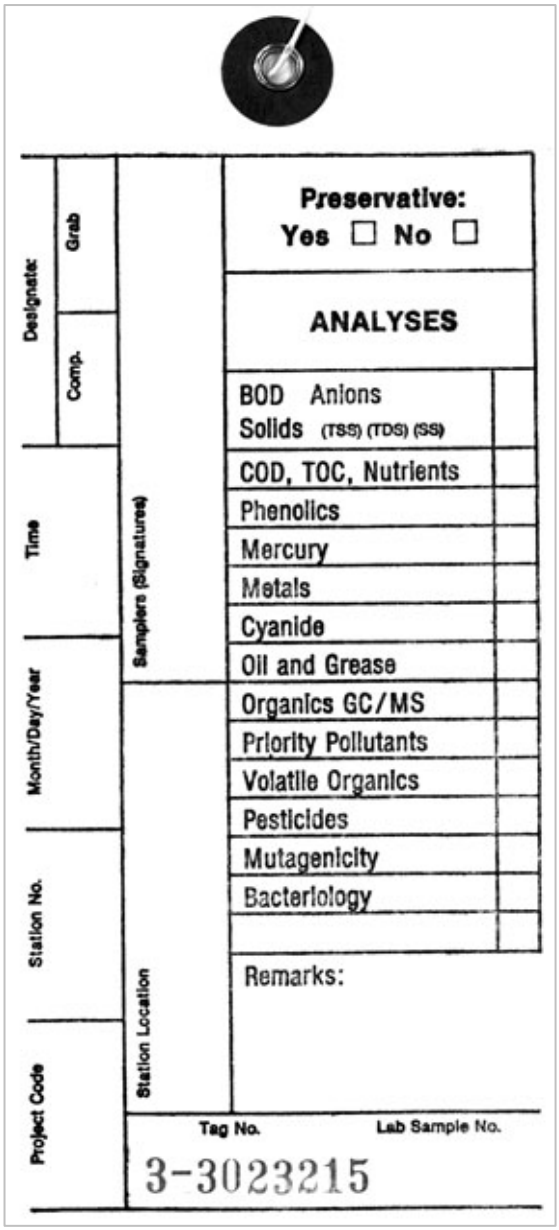
COMMENTS:

DISTRIBUTION: White and yellow copies accompany sample shipment to laboratory; yellow copy retained by laboratory. Pink copy retained by samplers.

1/98

Note: If requested by the client, different chain-of-custody records may be used. Copies of the template for this record may be obtained from the Chantilly Graphics Department.

Figure 2
Example Sample Tag



Note: Equivalent sample labels or tags may be used.

Project-Specific Modification

SOP No.: 2-1

SOP Title: Packaging and Shipping of Environmental Samples

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: _____ Date: 5/7/03

Technical Reviewer: _____ Date: 5/7/03

QA Reviewer: _____ Date: 5/12/03

EPA Approval: _____ Date: 5/19/03

Reason for and duration of modification: Procedures for shipping environmental samples for the Libby asbestos project vary slightly from CDM Technical SOP 2-1. These modifications are necessary for the entire duration of the project.

Samples collected during this investigation will be packaged and shipped in accordance with CDM Technical SOP 2-1, with the following modifications:

Section 1.4, Required Equipment - Vermiculite (or other absorbent material), bubble wrap, or ice will not be used for packaging or shipping samples.

Section 1.5, Procedures - No vermiculite or other absorbent material will be used to pack the samples. No ice will be used.

Packaging and Shipping Environmental Samples

SOP 2-1
Revision: 3
Date: March 2007

Prepared: Krista Lippoldt

Technical Review: Chuck Myers

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt

QA Review: Jo Nell Mullins

Approved:

Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt

Issued:

Signature/Date

1.0 Objective

The objective of this SOP is to outline the requirements for the packaging and shipment of environmental samples. Additionally, Sections 2.0 through 7.0 outline requirements for the packaging and shipping of regulated environmental samples under the Department of Transportation (DOT) Hazardous Materials Regulations, the International Air Transportation Association (IATA), and International Civil Aviation Organization (ICAO) Dangerous Goods Regulations for shipment by air and applies only to domestic shipments. This SOP does not cover the requirements for packaging and shipment of equipment (including data loggers and self-contained breathing apparatus [SCBAs] or bulk chemicals that are regulated under the DOT, IATA, and ICAO.

1.1 Packaging and Shipping of All Samples

This standard operating procedure (SOP) applies to the packaging and shipping of all environmental samples. If the sample is preserved or radioactive, the following sections may also be applicable.

Section 2.0 - Packaging and Shipping Samples Preserved with Methanol
Section 3.0 - Packaging and Shipping Samples Preserved with Sodium Hydroxide
Section 4.0 - Packaging and Shipping Samples Preserved with Hydrochloric Acid
Section 5.0 - Packaging and Shipping Samples Preserved with Nitric Acid
Section 6.0 - Packaging and Shipping Samples Preserved with Sulfuric Acid
Section 7.0 - Packaging and Shipping Limited-Quantity Radioactive Samples

1.2 Background

1.2.1 Definitions

Environmental Sample - An aliquot of air, water, plant material, sediment, or soil that represents the contaminant levels on a site. Samples of potential contaminant sources, like tanks, lagoons, or non-aqueous phase liquids are normally not “environmental” for this purpose. This procedure applies only to environmental samples that contain less than reportable quantities for any foreseeable hazardous constituents according to DOT regulations promulgated in 49 CFR - Part 172.101 Appendix A.

Custody Seal - A custody seal is a narrow adhesive-backed seal that is applied to individual sample containers and/or the container (i.e., cooler) before offsite shipment. Custody seals are used to demonstrate that sample integrity has not been compromised during transportation from the field to the analytical laboratory.

Inside Container - The container, normally made of glass or plastic, that actually contacts the shipped material. Its purpose is to keep the sample from mixing with the ambient environment.

Outside Container - The container, normally made of metal or plastic, that the transporter contacts. Its purpose is to protect the inside container.

Secondary Containment - The outside container provides secondary containment if the inside container breaks (i.e., plastic overpackaging if liquid sample is collected in glass).

Excepted Quantity - Excepted quantities are limits to the mass or volume of a hazardous material in the inside and outside containers below which DOT, IATA, ICAO regulations do not apply. The excepted quantity limits are very low. Most regulated shipments will be made under limited quantity.

Limited Quantity - Limited quantity is the maximum amount of a hazardous material below which there are specific labeling or packaging exceptions.

Performance Testing - Performance testing is the required testing of outer packaging. These tests include drop and stacking tests.

Qualified Shipper - A qualified shipper is a person who has been adequately trained to perform the functions of shipping hazardous materials.

1.2.2 Associated Procedures

- CDM Federal SOP 1-2, *Sample Custody*

1.2.3 Discussion

Proper packaging and shipping is necessary to ensure the protection of the integrity of environmental samples shipped for analysis. These shipments are potentially subject to regulations published by DOT, IATA, or ICAO. Failure to abide by these rules places both CDM and the individual employee at risk of serious fines. The analytical holding times for the samples must not be exceeded. The samples shall be packed in time to be shipped for overnight delivery. Make arrangements with the laboratory before sending samples for weekend delivery.

1.3 Required Equipment

- Coolers with return address of the appropriate CDM office
- Heavy-duty plastic garbage bags
- Plastic zip-type bags, small and large
- Clear tape
- Nylon reinforced strapping tape
- Duct tape
- Vermiculite (or an equivalent nonflammable material that is inert and absorbent)*
- Bubble wrap (optional)
- Ice
- Custody seals
- Completed chain-of-custody record or contract laboratory program (CLP) custody records, if applicable
- Completed bill of lading
- "This End Up" and directional arrow labels

*Check for any client-specific or laboratory requirements related to the use of absorbent packaging materials.

1.4 Packaging Environmental Samples

The following steps must be followed when packing sample bottles and jars for shipment:

1. Verify the samples undergoing shipment meet the definition of "environmental sample" and are not a hazardous material as defined by DOT. Professional judgment and/or consultation with qualified persons such as the appropriate health and safety coordinator or the health and safety manager shall be observed.

2. Select a sturdy cooler in good repair. Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler. Line the cooler with a large heavy-duty plastic garbage bag.

3. Be sure the caps on all bottles are tight (will not leak); check to see that labels and chain-of-custody records are completed properly (SOP 1-2, Sample Custody).

4. Place all bottles in separate and appropriately sized plastic zip-top bags and close the bags. Up to three VOA vials may be packed in one bag. Binding the vials together with a rubber band on the outside of the bag, or separating them so that they do not contact each other, will reduce the risk of breakage. Bottles may be wrapped in bubble wrap. Optionally, place three to six VOA vials in a quart metal can and then fill the can with vermiculite or equivalent. ***Note***: Trip blanks must be included in coolers containing VOA samples.

5. Place 2 to 4 inches of vermiculite (or equivalent) into a cooler that has been lined with a garbage bag, and then place the bottles and cans in the bag with sufficient space to allow for the addition of packing material between the bottles and cans. It is preferable to place glass sample bottles and jars into the cooler vertically. Glass containers are less likely to break when packed vertically rather than horizontally.

6. While placing sample containers into the cooler, conduct an inventory of the contents of the shipping cooler against the chain-of-custody record. The chain-of-custody with the cooler shall reflect only those samples within the cooler.

7. Put ice in large plastic zip-top bags (double bagging the zip-tops is preferred) and properly seal. Place the ice bags on top of and/or between the samples. Several bags of ice are required (dependant on outdoor temperature, staging time, etc.) to maintain the cooler temperature at approximately 4° Celsius (C) if the analytical method requires cooling. Fill all remaining space between the bottles or cans with packing material. Securely fasten the top of the large garbage bag with fiber or duct tape.

8. Place the completed chain-of-custody record or the CLP traffic report form (if applicable) for the laboratory into a plastic zip-top bag, seal the bag, tape the bag to the inner side of the cooler lid and close the cooler.

9. The cooler lid shall be secured with nylon reinforced strapping tape by wrapping each end of the cooler a minimum of two times. Attach a completed chain-of-custody seal across the opening of the cooler on opposite sides. The custody seals shall be affixed to the cooler with half of the seal on the strapping tape so that the cooler cannot be opened without breaking the seal. Complete two more wraps around with fiber tape and place clear tape over the custody seals.

10. The shipping container lid must be marked **"THIS END UP"** and arrow labels that indicate the proper upward position of the container shall be affixed to the cooler. A label containing the name and address of the shipper (CDM) shall be placed on the outside of the container. Labels used in the shipment of hazardous materials (such as Cargo Only Air Craft, Flammable Solids, etc.) are not permitted on the outside of containers used to transport environmental samples and shall not be used. The name and address of the laboratory shall be placed on the container, or when shipping by common courier, the bill of lading shall be completed and attached to the lid of the shipping container.

2.0 Packaging and Shipping Samples Preserved with Methanol

2.1 Containers

- The maximum volume of methanol in a sample container is limited to 30 ml.
- The sample container must not be full of methanol.

2.2 Responsibility

It is the responsibility of the qualified shipper to:

- Ensure that the samples undergoing shipment contain no other contaminant that meets the definition of "hazardous material" as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

2.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Inner packing may consist of glass or plastic jars
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test
- Survey documentation (if shipping from Department of Energy [DOE] or radiological sites)
- Class 3 flammable liquid labels
- Orientation labels
- Consignor/consignee labels

2.4 Packaging Samples Preserved with Methanol

The following steps are to be followed when packaging limited-quantity sample shipments:

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape before sampling.
- At a minimum the label must contain:
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- Wrap each container (40-ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place wrapped containers inside a polyethylene bottle filled with vermiculite; seal the bottle. (Maximum of 4 VOA vials will fit inside a 500-ml wide-mouth polyethylene bottle.)
- Total volume of methanol per shipping container must not exceed 500 ml.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tieing or taping.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

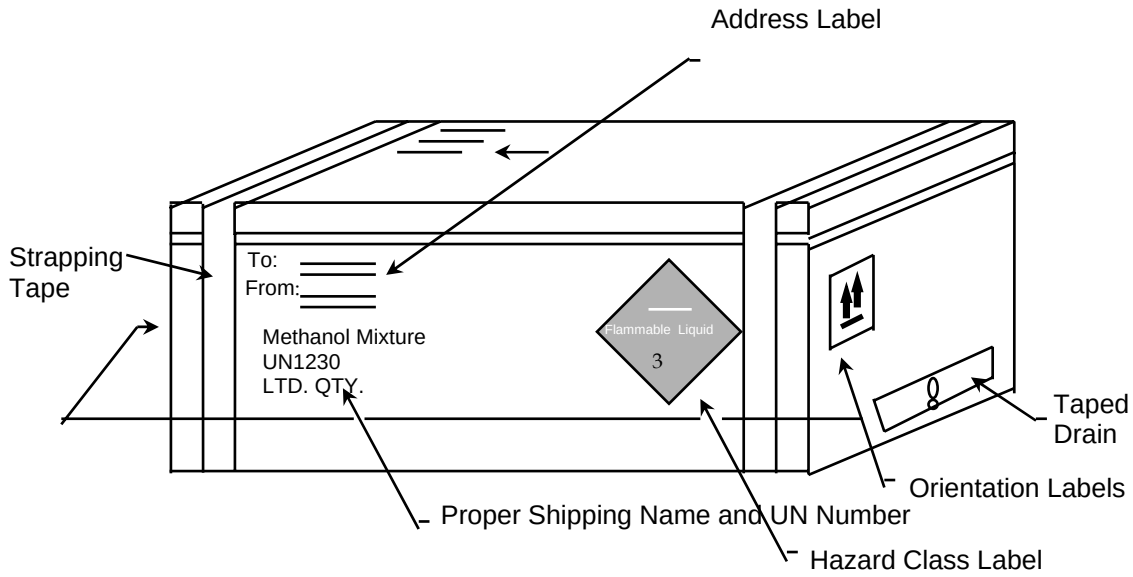
  Methanol Mixture
  UN1230
  LTD. QTY.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Flammable Liquid label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

Note: No marking or labeling can be obscured by strapping or duct tape.
Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

Figure 1
Example of Cooler Label/Marking Locations



3.0 Packaging and Shipping Samples Preserved with Sodium Hydroxide

3.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Sodium Hydroxide Preservatives

Preservative		***Desired in Final Sample***		***Quantity of Preservative (ml) for Specified Container***				
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**	**500 ml**	**1 L**
NaOH	30%	>12	0.08%		.25	0.5	1	2

5 drops = 1 ml

3.2 Responsibility

It is the responsibility of the qualified shipper to determine the amount of preservative in each sample so that accurate determination of quantities can be made.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

3.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test
- Inner packings may consist of glass or plastic jars no larger than 1 pint
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

3.4 Packaging Samples Preserved with Sodium Hydroxide

Samples containing NaOH as a preservative that exceed the excepted concentration of 0.08 percent (2 ml of a 30 percent NaOH solution per liter) may be shipped as a limited quantity per packing instruction Y819 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are to be followed when packaging limited-quantity samples shipments:

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape before sampling.
- At a minimum the label must contain:
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- This step is optional; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place glass containers inside a polyethylene bottle filled with vermiculite; seal the bottle.
- The total volume of sample in each cooler must not exceed 1 liter.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tieing or taping.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

  Sodium Hydroxide Solution
  UN1824
  LTD. QTY.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

Note: Samples meeting the exception concentration of 0.08 percent NaOH by weight may be shipped as nonregulated or nonhazardous following the procedure in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

4.0 Packaging and Shipping Samples Preserved with Hydrochloric Acid

4.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Hydrochloric Acid Preservatives

Preservative		***Desired in Final Sample***		***Quantity of Preservative (ml) for Specified Container***		
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**
HCl	2N	<1.96	0.04%	.2	.5	1

5 drops = 1 ml

4.2 Responsibility

It is the responsibility of the qualified shipper to:

- Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

4.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3.

- Inner packing may consist of glass or plastic jars no larger than 1 pint.
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

4.4 Packaging Samples Preserved with Hydrochloric Acid

The following steps are to be followed when packaging limited-quantity sample shipments:

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape before sampling.
- At a minimum the label must contain:
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- Wrap each container (40-ml VOA vials) in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place wrapped containers inside a polyethylene bottle filled with vermiculite; seal the bottle. (No more than 4 VOA vials will fit inside a 500-ml wide-mouth polyethylene bottle.)

- Total volume of sample inside each cooler must not exceed 1 liter.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tieing or taping.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

  Hydrochloric Acid Solution
  UN1789
  LTD. QTY.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

Note: Samples containing less than the exception concentration of 0.04 percent HCl by weight will be shipped as nonregulated or nonhazardous following the procedure in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

5.0 Packaging and Shipping Samples Preserved with Nitric Acid

5.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Nitric Acid Preservatives

Preservative		*Desired in Final Sample*		*Quantity of Preservative (ml) for Specified Container*				
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**	**500 ml**	**1 L**
HNO_3	6N	<1.62	0.15%		2	4	5	8

5 drops = 1 mg/L

5.2 Responsibility

It is the responsibility of the qualified shipper to:

- Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

5.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Inner packings may consist of glass or plastic jars no larger than 100 ml.
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

5.4 Packaging Samples Preserved with Nitric Acid

Samples containing HNO_3 as a preservative that exceed the excepted concentration of 0.15 percent HNO_3 will be shipped as a limited quantity per packing instruction Y807 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are to be followed when packaging limited-quantity sample shipments:

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape before sampling.
- At a minimum the label must contain:
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- This step is optional; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place glass containers inside a polyethylene bottle filled with vermiculite; seal the bottle.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tieing or taping.
- The maximum volume of preserved solution in the cooler must not exceed 500 ml.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

Nitric Acid Solution (with less than 20 percent)
UN2031
Ltd. Qty.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

Note: Samples meeting the exception concentration of 0.15 percent HNO_3 by weight will be shipped as nonregulated or nonhazardous following the procedure in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

6.0 Packaging and Shipping Samples Preserved with Sulfuric Acid

6.1 Containers

The inner packaging container (and amount of preservative) that may be used for these shipments includes:

Excepted Quantities of Sulfuric Acid Preservatives

Preservative		***Desired in Final Sample***		***Quantity of Preservative (ml) for Specified Container***				
		pH	**Conc.**	**40 ml**	**125 ml**	**250 ml**	**500 ml**	**1 L**
H_2SO_4	37N	<1.15	0.35%	.1	.25	0.5	1	2

5 drops = 1 ml

6.2 Responsibility

It is the responsibility of the qualified shipper to:

- Determine the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT
- Determine the amount of preservative in each sample so that accurate determination of quantities can be made

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

6.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Inner packings may consist of glass or plastic jars no larger than 100 ml.
- Outer packaging (for limited quantities) insulated cooler that has passed the ICAO drop test.
- Survey documentation (if shipping from DOE or radiological sites)
- Class 8 corrosive labels
- Orientation labels
- Consignor/consignee labels

6.4 Packaging of Samples Preserved with Sulfuric Acid

Samples containing H_2SO_4 as a preservative that exceed the excepted concentration of 0.35 percent will be shipped as a limited quantity per packing instruction Y809 of the IATA/ICAO Dangerous Goods Regulations.

The following steps are to be followed when packaging limited-quantity samples shipments:

- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape before sampling.
- At a minimum the label must contain:
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
  - Preservative (note amount of preservative used in miscellaneous section of the chain-of-custody form)
- Wrap each glass container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place the bubble-wrapped container into a 2.7-mil zip-type bag, removing trapped air.
- Place glass containers inside a polyethylene bottle filled with vermiculite; seal the bottle.
- Place sufficient amount of vermiculite in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- Place sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tieing or taping.
- The maximum volume of preserved solution in the cooler must not exceed 500 ml.
- The maximum weight of the cooler shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- Wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Mark the outside of the cooler with the proper shipping name of the contents, corresponding UN number, and LTD. QTY. (as shown below).

  Sulfuric Acid Solution
  UN2796
  LTD. QTY.

- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix a Corrosive label to the outside of the cooler.
- Affix package orientation labels on two opposite sides of the cooler.
- Secure the marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of cooler labeling/marking locations is shown in Figure 1.

Note: Samples containing less than the exception concentration of 0.35 percent H_2SO_4 by weight will be shipped as nonregulated or nonhazardous in accordance with the procedure described in Section 1.4.

Note: No marking or labeling can be obscured by strapping or duct tape.

Note: The inner packaging of dangerous goods must be placed into the designated cooler for shipment. Other nonregulated environmental samples may be added to the cooler for shipment.

- When shipping from a DOE facility, the cooler will be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Complete the Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity (Appendix A).
- Complete a Dangerous Goods Airbill.

7.0 Packaging and Shipping Limited-Quantity Radioactive Samples

7.1 Containers

The inner packaging containers that may be used for these shipments include:

- Any size sample container

7.2 Description/Responsibilities

- The qualified shipper will determine that the samples undergoing shipment contain no other contaminant that meets the definition of hazardous material as defined by DOT.
- The qualified shipper will ship all samples that meet the Class 7 definition of radioactive materials and meet the activity requirements specified in Table 7 of 49 CFR 173.425, as Radioactive Materials in Limited Quantity. The qualified shipper will verify that all packages and their contents meet the requirements of 49 CFR 173.421, *Limited Quantities of Radioactive Materials*.
- The packaging used for shipping will meet the general requirements for packaging and packages specified in 49 CFR 173.24 and the general design requirements provided in 173.410. These standards state that a package must be capable of withstanding the effects of any acceleration, vibration, or vibration resonance that may arise under normal condition of transport without any deterioration in the effectiveness of the closing devices on the various receptacles or in the integrity of the package as a whole and without loosening or unintentionally releasing the nuts, bolts, or other securing devices even after repeated use.
- If the shipment is from a DOE facility, radiological screenings will be completed on all samples taken. The qualified shipper will review the results of each screening (alpha, beta, and gamma speciation). Samples will not be shipped offsite until the radiological screening has been performed.
- The total activity for each package will not exceed the relevant limits listed in Table 7 of 49 CFR 173.425. The A_2 value of the material will be calculated based on all radionuclides found during previous investigations (if any) in the area from which the samples are derived. The A_2 values to be used will be the most restrictive of all potential radionuclides as listed in 49 CFR 173.435.
- The radiation level at any point on the external surface of the package bearing the sample(s) will not exceed 0.005 mSv/hour (0.5 mrem/hour). These will be verified by dose and activity monitoring before shipment of the package.
- The removable radioactive surface contamination on the external surface of the package will not exceed the limits specified in 49 CFR 173.443(a). CDM will apply the DOE-established free release criteria for removable surface contamination of less than 20 dpm/100 cm^2 (alpha) and 1,000 dpm/100 cm^2 (beta/gamma). It shall be noted that these values are more conservative than the DOT requirements for removable surface contamination.
- The qualified shipper will verify that the outside of the inner packaging is marked “Radioactive.”
- The qualified shipper will verify that the excepted packages prepared for shipment under the provisions of 49 CFR 173.421 have a notice enclosed, or shown on the outside of the package, that reads, **“This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910.”**

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance project plan (QAPP).

7.3 Additional Required Equipment

The following equipment is needed in addition to the required equipment listed in Section 1.3:

- Survey documentation/radiation screening results (if shipping from DOE or radiological sites)
- Orientation labels
- Excepted quantities label
- Consignor/consignee labels

7.4 Packaging of Limited-Quantity Radioactive Samples

The following steps are to be followed when packaging limited-quantity sample shipments:

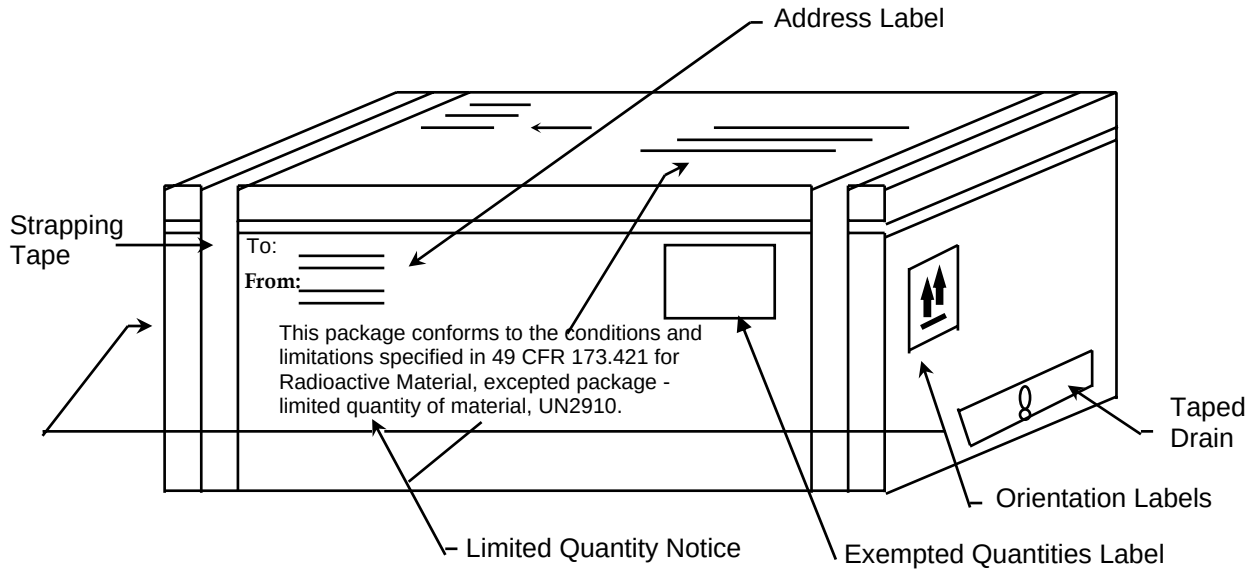
- The cooler is to be surveyed by a qualified radiation control technician to ensure that radiation flux on exterior surfaces does not exceed 0.5 mrem/h on all sides. This survey will be documented and the results reviewed by the qualified shipper.
- Tape any interior opening in the cooler (drain plug) from the inside to ensure control of interior contents. Also, tape the drain plug from the outside of the cooler.
- All sample containers will be properly labeled and the label protected with waterproof tape before sampling.
- At a minimum the label must contain:
  - Project name
  - Project number
  - Date and time of sample collection
  - Sample location
  - Sample identification number
  - Collector's initials
- This step is optional; wrap each container in bubble wrap (secure with waterproof tape) to prevent breakage.
- Place sufficient amount of vermiculite, or approved packaging material, in the bottom of the cooler to absorb any leakage that may occur.
- Place a garbage bag in the cooler.
- Pack the samples appropriately inside the garbage bag (bottles placed upright) to prevent movement during shipment.
- If required, place a sufficient amount of double-bagged ice around the samples to maintain the required temperature during shipment.
- Seal the garbage bag by tieing or taping.
- Place a label marked Radioactive on the outside of the sealed bag.
- Enclose a notice that includes the name of the consignor or consignee and the following statement: ***"This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910."***
- Note that both DOT and IATA apply different limits to the quantity in the inside packing and in the outside packing.
- The maximum weight of the package shall not exceed 30 kg (66 lbs) for any limited-quantity shipment of dangerous goods.
- Secure the chain-of-custody form (placed inside a zip-type bag) to the interior of the cooler lid.
- If the shipment is from a DOE or other facility, place the results of the radiation screen and cooler/sample survey with the chain-of-custody.
- If a cooler is used, wrap strapping tape or duct tape around both ends of the cooler and around the cooler lid.
- Affix custody seals to opposite sides of the cooler lid. Cover the custody seals with clear waterproof tape.
- Place a label on the front of the cooler with the company name, contact name, phone number, full street address, and state with zip code for both shipper and recipient.
- Affix package orientation labels on two opposite sides of the cooler/package.
- Affix a completed Excepted Quantities label to the side of the cooler/package.
- Secure any marking and labels to the surface of the cooler with clear waterproof tape to prevent accidental removal during shipment.
- An example of the cooler labeling/marking is shown in Figure 2.

Note: No marking or labeling can be obscured by strapping or duct tape.

- Complete the Shipment Quality Assurance Checklist (Appendix B).

Note: Except as provided in 49 CFR 173.426, the package will not contain more than 15 grams of ^{235}U.
Note: A declaration of dangerous goods is not required.

Figure 2
Radioactive Material – Limited-Quantity Cooler Marking Example



8.0 References

U. S. Environmental Protection Agency. Region IV. February 1991 or current. *Standard Operating Procedures and Quality Assurance Manual*.

_____. 1996 or current. *Sampler's Guide to the Contract Laboratory Program*, EPA/540/R-96/032.

Title 49 Code of Federal Regulations, Department of Transportation. 2005 or current revision. *Hazardous Materials Table, Special Provisions, Hazardous, Materials Communications, Emergency Response Information, and Training Requirements*, 49 CFR 172.

Title 49 Code of Federal Regulations, Department of Transportation. 2005 or current revision. *Shippers General Requirements for Shipments and Packagings*, 49 CFR 173.

Appendix A

Dangerous Goods and Hazardous Materials Inspection Checklist for Shipping Limited-Quantity

Sample Packaging

Yes	No	N/A	
❑	❑	❑	The VOA vials are wrapped in bubble wrap and placed inside a zip-type bag.
❑	❑	❑	The VOA vials are placed into a polyethylene bottle, filled with vermiculite, and tightly sealed.
❑	❑	❑	The drain plug is taped inside and outside to ensure control of interior contents.
❑	❑	❑	The samples have been placed inside garbage bags with sufficient bags of ice to preserve samples at 4°C.
❑	❑	❑	The cooler weighs less than the 66-pound limit for limited-quantity shipment.
❑	❑	❑	The garbage bag has been sealed with tape (or tied) to prevent movement during shipment.
❑	❑	❑	The chain-of-custody has been secured to the interior of the cooler lid.
❑	❑	❑	The cooler lid and sides have been taped to ensure a seal.
❑	❑	❑	The custody seals have been placed on both the front and back hinges of the cooler, using waterproof tape.

Air Waybill Completion

Yes	No	N/A	
❑	❑	❑	Section 1 has the shipper's name, company, and address; the account number, date, internal billing reference number; and the telephone number where the shipper can be reached.
❑	❑	❑	Section 2 has the recipient's name and company along with a telephone number where they can be reached.
❑	❑	❑	Section 3 has the **Bill Sender** box checked.
❑	❑	❑	Section 4 has the **Standard Overnight** box checked.
❑	❑	❑	Section 5 has the **Deliver Weekday** box checked.
❑	❑	❑	Section 6 has the number of packages and their weights filled out. Was the total of all packages and their weights figured up and added at the bottom of Section 6?
❑	❑	❑	Under the **Transport Details** box, the **Cargo Aircraft Only** box is obliterated, leaving only the **Passenger and Cargo Aircraft** box.
❑	❑	❑	Under the **Shipment Type**, the **Radioactive** box is obliterated, leaving only the **Non-Radioactive** box.
❑	❑	❑	Under the **Nature and Quantity of Dangerous Goods** box, the **Proper Shipping Name, Class or Division, UN or ID No., Packing Group, Subsidiary Risk, Quantity and Type of Packing, Packing Instructions, and Authorization** have been filled out for the type of chemical being sent.
❑	❑	❑	The **Name, Place and Date, Signature, and Emergency Telephone Number** appears at the bottom of the FedEx Airbill.
❑	❑	❑	The statement "In accordance with IATA/ICAO" appears in the **Additional Handling Information** box.
❑	❑	❑	The E**mergency Contact Information** at the bottom of the FedEx Airbill is truly someone who can respond any time of the day or night.

Proper Shipping Name	*Class or Division*	*UN or ID No.*	*Packing Group*	*Sub Risk*	*Quantity*	*Packing Instruction*	*Authorization*
Hydrochloric Acid Solution	8	UN1789	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Nitric Acid Solution (with less than 20%)	8	UN2031	II		1 plastic box × 0.5 L	Y807	Ltd. Qty.
Sodium Hydroxide Solution	8	UN1824	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Sulfuric Acid Solution	8	UN2796	II		1 plastic box × 0.5 L	Y809	Ltd. Qty.
Methanol	3	UN1230	II		1 plastic box × 1 L	Y305	Ltd. Qty.

Sample Cooler Labeling

Yes	No	N/A	
❑	❑	❑	The proper shipping name, UN number, and Ltd. Qty. appears on the shipping container.
❑	❑	❑	The corresponding hazard labels are affixed on the shipping container; the labels are not obscured by tape.
❑	❑	❑	The name and address of the shipper and receiver appear on the top and side of the shipping container.
❑	❑	❑	The air waybill is attached to the top of the shipping container.
❑	❑	❑	**Up Arrows** have been attached to opposite sides of the shipping container.
❑	❑	❑	Packaging tape does not obscure markings or labeling.

Appendix B
Shipment Quality Assurance Checklist

Date: _____ Shipper: _____ Destination: _____

Item(s) Description: _____

Radionuclide(s): _____

Radiological Survey Results: surface _____mrem/hr 1 meter _____

Instrument Used: Mfgr: _____ Model: _____

S/N: _____ Cal Date: _____

Limited-Quantity or Instrument and Article

Yes	No		
___	___	1.	Strong tight package (package that will not leak material during conditions normally incidental to transportation).
___	___	2.	Radiation levels at any point on the external surface of package less than or equal to 0.5 mrem/hr.
___	___	3.	Removable surface contamination less than 20 dpm/100 cm^2 (alpha) and 1,000 dpm/100 cm^2 (beta/gamma).
___	___	4.	Outside inner package bears the marking "Radioactive."
___	___	5.	Package contains less than 15 grams of ^{235}U (check yes if ^{235}U not present).
___	___	6.	Notice enclosed in or on the package that includes the consignor or consignee and the statement, **"This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package-limited quantity of material, UN2910."**
___	___	7.	Activity less than that specified in 49 CFR 173.425. Permissible package limit: Package Quantity:
___	___	8.	On all air shipments, the statement **Radioactive Material, excepted package-limited quantity of material** shall be noted on the air waybill.

Qualified Shipper: _____ Signature: _____

Project Specific Modification

SOP No.: 2-2

SOP Title: Guide to Handling Investigation-Derived Waste

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: _____ Date: 5/9/03

Technical Reviewer: _____ Date: 5/7/03

QA Reviewer: _____ Date: 5/12/03

EPA Approval: _____ Date: 5/19/03

Reason for and duration of modification: Site-specific procedures for disposing of Libby amphibole asbestos contaminated IDW are different than CDM Technical SOP 2-2. These modifications are necessary for the entire duration of the project.

All IDW will be handled in accordance with CDM Technical SOP 2-2, Guide to Handling Investigation-Derived Waste, with the following modifications:

Section 5.2, Off Site Disposal - All IDW (not including excess soil volume) will be collected in transparent garbage bags and marked "IDW" with an indelible marker. These bags will be deposited into the asbestos contaminated waste stream for deposal at the mine.

Guide to Handling Investigation-Derived Waste

SOP 2-2
Revision: 5
Date: March 2007

Prepared: Tim Eggert

Technical Review: Matt Brookshire

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt

QA Review: Jo Nell Mullins

Approved:

Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt

Issued:

Signature/Date

1.0 Objective

This standard operating procedure (SOP) presents guidance for the management of investigation-derived waste (IDW). The primary objectives for managing IDW during field activities include:

- Leaving the site in no worse condition than existed before field activities
- Removing wastes that pose an immediate threat to human health or the environment
- Proper handling of onsite wastes that do not require offsite disposal or extended aboveground containerization
- Complying with federal, state, local, and facility applicable or relevant and appropriate requirements (ARARs)
- Careful planning and coordination of IDW management options
- Minimizing the quantity of IDW

2.0 Background

2.1 Definitions

Hazardous Waste - Discarded material that is regulated listed waste, or waste that exhibits ignitability, corrosivity, reactivity, or toxicity as defined in 40 CFR 261.3 or state regulations.

Investigation-Derived Wastes - Discarded materials resulting from field activities such as sampling, surveying, drilling, excavations, and decontamination processes that, in present form, possess no inherent value or additional usefulness without treatment. Wastes may be solid, sludge, liquid, gaseous, or multiphase materials that may be classified as hazardous or nonhazardous.

Mixed Waste - Any material that has been classified as hazardous and radioactive.

Radioactive Wastes - Discarded materials that are contaminated with radioactive constituents with specific activities in concentrations greater than the latest regulatory criteria (i.e., 10 CFR 20).

Treatment, Storage, and Disposal Facility (TSDF) - Permitted facilities that accept hazardous waste shipments for further treatment, storage, and/or disposal. These facilities must be permitted by the U. S. Environmental Protection Agency (EPA) and appropriate state and local agencies.

2.2 Discussion

Field investigation activities result in the generation of waste materials that may be characterized as hazardous or radioactive waste. IDWs may include drilling muds, cuttings, and purge water from test pit and well installation; purge water, soil, and other materials from collection of samples; residues from testing of treatment technologies and pump and treat systems; personal protective equipment (PPE); solutions (aqueous or otherwise) used to decontaminate nondisposable protective clothing and equipment; and other wastes or supplies used in sampling and testing potentially hazardous or radiologically contaminated material.

Note: The client's representatives may not be aware of all potential contaminants. The management of IDW must comply with applicable regulatory requirements.

3.0 General Responsibilities

Site Manager - The site manager is responsible for ensuring that all IDW procedures are conducted in accordance with this SOP. The site manager is also responsible for ensuring that handling of IDW is in accordance with site-specific requirements.

Project Manager - The project manager is responsible for identifying site-specific requirements for the disposal of IDW in accordance with federal, state, and/or facility requirements.

Field Crew Members - Field crew members are responsible for implementing this SOP and communicating any unusual or unplanned condition to the project manager's attention.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site/project specific quality assurance plan.

4.0 Required Equipment

Equipment required for IDW containment will vary according to site-specific/client requirements. Management decisions concerning the necessary equipment required shall consider: containment method, sampling, labeling, maneuvering, and storage (if applicable). Equipment must be onsite and inspected before commencing work.

4.1 IDW Containment Devices

The appropriate containment device (drums, tanks, etc.) will depend on site- or client-specific requirements and the ultimate disposition of the IDW. Typical IDW containment devices can include:

- Plastic sheeting (polyethylene) with a minimum thickness of 20 millimeters
- Department of Transportation (DOT)-approved steel containers
- Polyethylene or steel bulk storage tanks

Containment of IDW shall be segregated by waste type (i.e., solid or liquid, corrosive or flammable, etc.) and source location. Volume of the appropriate containment device shall be site-specific.

4.2 IDW Container Labeling

A "Waste Container" or "IDW Container" label or indelible marking shall be applied to each container. Labeling or marking requirements for onsite IDW not expected to be transported offsite are:

- Labels and markings that contain the following information: project name, generation date, location of waste origin, container identification number, sample number (if applicable), and contents (drill cuttings, purge water, PPE, etc.).
- Each label or marking will be applied to the upper one-third of the container at least twice, on opposite sides.
- Containers that are 5 gallons or less may only require one label or set of markings.
- Labels or markings will be positioned on a smooth part of the container. The label must not be affixed across container bungs, seams, ridges, or dents.
- Labels must be constructed of a weather-resistive material with markings made with a permanent marker or paint pen and capable of enduring the expected weather conditions. If markings are used, the color must be easily distinguishable from the drum color.
- Labels will be secured in a manner to ensure the label remains affixed to the container.

Labeling or marking requirements for IDW expected to be transported offsite must be in accordance with the requirements of 49 CFR 172.

4.3 IDW Container Movement

Staging areas for IDW containers shall be predetermined and in accordance with site-specific and/or client requirements. Arrangements shall be made before field mobilization as to the methods and personnel required to safely transport IDW containers to the staging area. Transportation offsite onto a public roadway is prohibited unless 49 CFR 172 requirements are met.

4.4 IDW Container Storage

Containerized IDW shall be staged pending chemical analysis or further onsite treatment. Staging areas and bulk storage procedures are to be determined according to site-specific requirements. Containers are to be stored in such a fashion that the labels can be easily read. A secondary/spill container must be provided for liquid IDW storage and as appropriate for solid IDW storage.

5.0 Procedures

The three general options for managing IDW are (1) collection and onsite disposal, (2) collection for offsite disposal, and (3) collection and interim management. Attachment 1 summarizes media-specific information on generation processes and management options. The option selected shall take into account the following factors:

- Type (soil, sludge, liquid, debris), quantity, and source of IDW
- Risk posed by managing the IDW onsite
- Compliance with regulatory requirements
- IDW minimization and consistency with the IDW remedy and the site remedy

In all cases the client shall approve the plans for IDW. Formal plans for the management of IDW must be prepared as part of a work plan or separate document.

5.1 Collection and Onsite Disposal

5.1.1 Soil/Sludge/Sediment

The options for handling soil/sludge/sediment IDW are as follows:

1. Return to boring, pit, or source immediately after generation as long as returning the media to these areas will not increase site risks (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate “clean” areas).

2. Spread around boring, pit, or source within the area of contamination (AOC) as long as returning the media to these areas will not increase site risks (e.g., direct contact with surficial contamination).

3. Consolidate in a pit within the AOC as long as returning the media to these areas will not increase site risks (e.g., the contaminated soil will not be replaced at a greater depth than where it was originally so that it will not contaminate “clean” areas).

4. Send to onsite TSDF - may require analytical analysis before treatment/disposal.

Note: These options may require client and/or regulatory approval.

5.1.2 Aqueous Liquids

The options for handling aqueous liquid IDW are as follows:

1. Discharge to surface water, only when IDW is not contaminated.

2. Discharge to ground surface close to the well, only if soil contaminants will not be mobilized in the process and the action will not contaminate clean areas. If IDW from the sampling of background upgradient wells is not a community concern or associated with soil contamination, this presumably uncontaminated IDW may be released on the ground around the well.

3. Discharge to sanitary sewer, only when IDW is not contaminated.

4. Send to onsite TSDF - may require analysis before treatment/disposal.

Note: These options may require analytical results to obtain client and/or regulatory approval.

5.1.3 Disposable PPE

The options for handling disposable PPE are as follows:

1. Double-bag contents in nontransparent trash bags and place in onsite industrial dumpster, only if PPE is not contaminated.

2. Containerize, label, and send to onsite TSDF - may require analysis before treatment/disposal.

5.2 Collection for Offsite Disposal

Before sending to an offsite TSDF, analysis may be required. Manifests are required. In some instances, a bill of lading can be used for nonhazardous solid IDW (i.e., wooden pallets, large quantities of plastic sheeting). Arrangements must be made with the client responsible for the site to sign as generator on any waste profile and all manifests or bill of ladings; it is CDM's policy not to sign manifests. The TSDF and transporter must be permitted for the respective wastes. Nonbulk containers (e.g., drums) must have a DOT-approved label adhered to the container and all required associated placard stickers before leaving for a TSDF off site. These labels must include information as required in 49 CFR 172. Bulk containers (i.e., rolloffs, tanks) do not require container specific labels for transporting off site, but must include appropriate placards as required in 49 CFR 172.

5.2.1 Soil/Sludge/Sediment

When the final site remedy requires offsite treatment and disposal, the IDW may be stored (e.g., drummed, covered in a waste pile) or returned to its source until final disposal. The management option selected shall take into account the potential for increased risks, applicable regulations, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

5.2.2 Aqueous Liquids

When the final site remedy requires offsite treatment and disposal, the IDW may be stored (e.g., mobile tanks or drums with appropriate secondary containment) until final disposal. The management option selected shall take into account the potential for increased risks, applicable regulations, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

5.2.3 Disposable PPE

When the final site remedy requires offsite treatment disposal, the IDW may be containerized and stored. The management option selected shall take into account potential for increased risks, applicable regulations, and other relevant site-specific factors (e.g., weather, storage space, and public concern/perceptions).

5.3 Collection and Interim Management

All interim measures must be approved by the client and regulatory agencies.

1. Storing IDW onsite until the final action may be practical in the following situations:
   - Returning wastes (especially sludges and soils) to their onsite source area would require reexcavation for disposal in the final remediation alternative.
   - Interim storage in containers may be necessary to provide adequate protection to human health and the environment.
   - Offsite disposal options may trigger land disposal regulations under the Resource Conservation and Recovery Act (RCRA). Storing IDW until the final disposal of all wastes from the site will eliminate the need to address this issue more than once.
   - Interim storage may be necessary to provide time for sampling and analysis.

2. Segregate and containerize all waste for future treatment and/or disposal.
   - Containment options for soil/sludge/sediment may include drums or covered waste piles in AOC.
   - Containment options for aqueous liquids may include mobile tanks or drums.
   - Containment options for PPE may include drums or roll-off boxes.

6.0 Restrictions/Limitations

Site Managers Shall Determine the Most Appropriate Disposal Option for Aqueous Liquids on a Site-Specific Basis. Parameters to consider, especially when determining the level of protection, include the volume of IDW, the contaminants present in the groundwater, the presence of contaminants in the soil at the site, whether the groundwater or surface water is a drinking water supply, and whether the groundwater plume is contained or moving. Special disposal/handling may be needed for drilling fluids because they may contain significant solid components.

Disposable sampling materials, disposable PPE, decontamination fluids, etc. will always be managed on a site-specific basis. **Under No Circumstances Shall These Types of Materials Be Brought Back to the Office or Warehouse**.

7.0 References

Environmental Resource Center. 1997. *Hazardous Waste Management Compliance Handbook 2nd Edition*. Karnofsky (Editor).

Academy of Certified Hazardous Materials Manager. May 1999. *Hazardous Materials Management Desk Reference*. Cox.

Title 49 Code of Federal Regulations, Department of Transportation. 2005 or current revision. *Hazardous Materials Table, Special Provisions, Hazardous, Materials Communications, Emergency Response Information, and Training Requirements*, 49 CFR 172.

U. S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.1.

_____. August 1990. *Low-Level Mixed Waste: A RCRA Perspective for NRC Licensees*, EPA/530-SW-90-057.

_____. May 1991. *Management of Investigation-Derived Wastes During Site Inspections*, EPA/540/G-91/009.

_____. January 1992. *Guide to Management of Investigation-Derived Wastes*, 9345.3-03FS.

_____. Region IV. November 2001. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*.

Attachment 1
IDW Management Options

Type of IDW	*Generation Processes*	*Management Options*
Soil	■ Well/Test pit installations ■ Borehole drilling ■ Soil sampling	**Onsite Disposal** ■ Return to boring, pit, or source immediately after generation ■ Spread around boring, pit, or source within the AOC ■ Consolidate in a pit (within the AOC) ■ Send to onsite TSDF **Offsite Disposal** ■ Client to send to offsite TSDF **Interim Management** ■ Store for future treatment and/or disposal
Sludge/Sediment	■ Sludge pit/sediment sampling	**Onsite Disposal** ■ Return to boring, pit, or source immediately after generation ■ Send to onsite TSDF **Offsite Disposal** ■ Client to send to offsite TSDF **Interim Management** ■ Store for future treatment and/or disposal
Aqueous Liquids (groundwater, surface water, drilling fluids, wastewaters)	■ Well installation/development ■ Well purging during sampling ■ Groundwater discharge during pump tests ■ Surface water sampling ■ Wastewater sampling	**Onsite Disposal** ■ Pour onto ground close to well (nonhazardous waste) ■ Discharge to sewer ■ Send to onsite TSDF **Offsite Disposal** ■ Client to send to offsite commercial treatment unit ■ Client to send to publicly owned treatment works (POTW) **Interim Management** ■ Store for future treatment and/or disposal
Decontamination Fluids	■ Decontamination of PPE and equipment	**Onsite Disposal** ■ Send to onsite TSDF ■ Evaporate (for small amounts of low contamination organic fluids) ■ Discharge to ground surface **Offsite Disposal** ■ Client to send to offsite TSDF ■ Discharge to sewer **Interim Management** ■ Store for future treatment and/or disposal
Disposable PPE and Sampling Equipment	■ Sampling procedures or other onsite activities	**Onsite Disposal** ■ Place in onsite industrial dumpster ■ Send to onsite TSDF **Offsite Disposal** ■ Client to send to offsite TSDF **Interim Management** ■ Store for future treatment and/or disposal

Adapted from U. S. Environmental Protection Agency, *Guide to Management of Investigation-Derived Wastes*, 9345-03FS, January 1992.

Project-Specific Modification

SOP No.: 4-1

SOP Title: Field Logbook Content and Control

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: _____ Date: 5/7/03

Technical Reviewer: _____ Date: 5/7/03

QA Reviewer: _____ Date: 5/12/03

EPA Approval: _____ Date: 5/19/03

Reason for and duration of modification: Site-specific procedures field logbook completions are different than CDM Technical SOP 4-1. These modifications are necessary for the entire duration of the project.

All content and control of will logbooks will be done accordance with CDM Technical SOP 4-1, Field Logbook Content and Control, with the following modifications:

Section 5.2, Operation – A new page will be completed for each property where information is collected for RI activities. The header information will include the address, the name of the property owner, and the building identification number of structures on the property.

When following the line-out and signature procedures to close a logbook page, the author must also print their name under the signature.

Field Logbook Content and Control

SOP 4-1
Revision: 6
Date: March 2007

Prepared: Del Baird

Technical Review: Laura Splichal

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt

QA Review: Jo Nell Mullins

Approved:

Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt

Issued:

Signature/Date

1.0 Objective

The objective of this standard operating procedure (SOP) is to set CDM Federal (CDM) criteria for content entry and form of field logbooks. Field logbooks are an essential tool to document field activities for historical and legal purposes.

2.0 Background

2.1 Definitions

Biota - The flora and fauna of a region.

Magnetic Declination Corrections - Compass adjustments to correct for the angle between magnetic north and geographical meridians.

2.2 Discussion

Information recorded in field logbooks includes field team names; observations; data; calculations; date/time; weather; and description of the data collection activity, methods, instruments, and results. Additionally, the logbook may contain deviations from plans and descriptions of wastes, biota, geologic material, and site features including sketches, maps, or drawings as appropriate.

3.0 General Responsibilities

Field Team Leader (FTL) - The FTL is responsible for ensuring that the format and content of data entries are in accordance with this procedure.

Site Personnel - All CDM employees who make entries in field logbooks during onsite activities are required to read this procedure before engaging in this activity. The FTL will assign field logbooks to site personnel who will be responsible for their care and maintenance. Site personnel will return field logbooks to the records file at the end of the assignment.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities should be defined in the field plan or site-/project-specific quality assurance plan.

4.0 Required Equipment

- Site-specific plans
- Field logbook
- Indelible black or blue ink pen
- Ruler or similar scale

5.0 Procedures

5.1 Preparation

In addition to this SOP, site personnel responsible for maintaining logbooks must be familiar with all procedures applicable to the field activity being performed. These procedures should be consulted as necessary to obtain specific information about equipment and supplies, health and safety, sample collection, packaging, decontamination, and documentation. These procedures should be located at the field office or vehicle for easy reference.

Field logbooks shall be bound with lined, consecutively numbered pages. All pages must be numbered before initial use of the logbook. Before use in the field, each logbook will be marked with a specific document control number issued by

the document control administrator, if required by the contract quality implementation plan (QIP). Not all contracts require document control numbers. The following information shall be recorded on the cover of the logbook:

- Field logbook document control number (if applicable).
- Activity (if the logbook is to be activity-specific), site name, and location.
- Name of CDM contact and phone number(s) (typically the project manager).
- Start date of entries.
- End date of entries.
- In specific cases, special logbooks may be required (e.g., waterproof paper for stormwater monitoring).

The first few (approximately five) pages of the logbook will be reserved for a table of contents (TOC). Mark the first page with the heading and enter the following:

Table of Contents

Date/Description	Pages
(Start Date)/Reserved for TOC	1-5

The remaining pages of the table of contents will be designated as such with "TOC" written on the top center of each page. The table of contents should be completed as activities are completed and before placing the logbook in the records file.

5.2 Operation

Requirements that must be followed when using a logbook:

- Record work, observations, quantities of materials, calculations, drawings, and related information directly in the logbook. If data collection forms are specified by an activity-specific plan, this information does not need to be duplicated in the logbook. However, any forms used to record site information must be referenced in the logbook.
- Do not start a new page until the previous one is full or has been marked with a single diagonal line so that additional entries cannot be made. Use both sides of each page.
- Do not erase or blot out any entry at any time. Indicate any deletion by a single line through the material to be deleted. Initial and date each deletion. Take care to not obliterate what was written previously.
- Do not remove any pages from the book.

Specific requirements for field logbook entries include:

- Initial and date each page.
- Sign and date the final page of entries for each day.
- Initial and date all changes.
- Multiple authors must sign out the logbook by inserting the following:
  Above notes authored by:
  - (Sign name)
  - (Print name)
  - (Date)
- A new author must sign and print his/her name before additional entries are made.
- Draw a diagonal line through the remainder of the final page at the end of the day.
- Record the following information on a daily basis:
  - Date and time
  - Name of individual making entry
  - Names of field team and other persons onsite
  - Description of activity being conducted including station or location (i.e., well, boring, sampling location number) if appropriate
  - Weather conditions (i.e., temperature, cloud cover, precipitation, wind direction, and speed) and other pertinent data
  - Level of personal protection used
  - Serial numbers of instruments
  - Equipment calibration information
  - Serial/tracking numbers on documentation (e.g., carrier air bills)

Entries into the field logbook shall be preceded with the time (written in military units) of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged. All measurements made and samples collected must be recorded unless they are documented by automatic methods (e.g., data logger) or on a separate form required by an operating procedure. In these cases, the logbook must reference the automatic data record or form.

At each station where a sample is collected or an observation or measurement made, a detailed description of the location of the station is required. Use a compass (include a reference to magnetic declination corrections), scale, or nearby survey markers, as appropriate. A sketch of station location may be warranted. All maps or sketches made in the logbook should have descriptions of the features shown and a direction indicator. It is preferred that maps and sketches be oriented so that north is toward the top of the page. Maps, sketches, figures, or data that will not fit on a logbook page should be referenced and attached to the logbook to prevent separation.

Other events and observations that should be recorded include:

- Changes in weather that impact field activities.
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation.
- Problems, downtime, or delays.
- Upgrade or downgrade of personal protection equipment.
- Visitors to the site.

5.3 Post-Operation

To guard against loss of data as a result of damage or disappearance of logbooks, completed pages shall be periodically photocopied (weekly, at a minimum) and forwarded to the field or project office. Other field records shall be photocopied and submitted regularly and as promptly as possible to the office. When possible, electronic media such as disks and tapes should be copied and forwarded to the project office.

At the conclusion of each activity or phase of site work, the individual responsible for the logbook will ensure that all entries have been appropriately signed and dated and that corrections were made properly (single lines drawn through incorrect information, then initialed and dated). The completed logbook shall be submitted to the records file.

6.0 Restrictions/Limitations

Field logbooks constitute the official record of onsite technical work, investigations, and data collection activities. Their use, control, and ownership are restricted to activities pertaining to specific field operations carried out by CDM personnel and their subcontractors. They are documents that may be used in court to indicate dates, personnel, procedures, and techniques employed during site activities. Entries made in these logbooks should be factual, clear, precise, and nonsubjective. Field logbooks, and entries within, are not to be used for personal use.

7.0 References

Sandia National Laboratories. 1991. *Procedure for Preparing Sampling and Analysis Plan, Site-Specific Sampling Plan, and Field Operating Procedures,* QA-02-03. Albuquerque Environmental Program, Department 3220, Albuquerque, New Mexico.

Sandia National Laboratories. 1992. *Field Operation Procedure for Field Logbook Content and Control*. Environmental Restoration Department, Division 7723, Albuquerque, New Mexico.

Project-Specific Modification

SOP No.: 4-2

SOP Title: Photographic Documentation of Field Activities

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: _____ Date: 5/7/03

Technical Reviewer: _____ Date: 5/7/03

QA Reviewer: _____ Date: 5/12/03

EPA Approval: _____ Date: 5/19/03

Reason for and duration of modification: Site-specific procedures for photographs taken by digital cameras are different than the current SOP.

All photographs will be recorded in accordance with CDM Technical SOP 4-2, Photographic Documentation of Field Activities, with the following modifications:

Section 5.2.2, General Guidelines for Still Photography - A slate is not required for each new roll of film. The information for the slate will be recorded in the field logbook. The numbers assigned by the digital camera will be used instead of the photographer assigning the number. The caption information will either be on the back of the photograph or the photograph will be numbered or labeled and the caption information listed next to the number or label in the photograph log. On the digital photos, a caption will be included in the picture stating property address/location, date, and name of feature. All team members, as stated in the logbook, will be photographers and witnesses at the property. Slates are not required for close-up photographs. Instead the required information can be listed in the logbook or photograph log. A color strip is not required for close-up or feature photographs.

Section 5.2.4, Photographic Documentation - The name of the laboratory, time and date of drop-off, and receipt of film is not required to be recorded for this project.

Project-Specific Modification

Section 5.3.2, Archive Procedures - Digital photographs will be archived on compact discs. These discs will be assigned a document control dumber written on the disc case as well as well as the disc.

Photographic Documentation of Field Activities

SOP 4-2
Revision: 7
Date: March 2007

Prepared: David O. Johnson

Technical Review: Sharon Budney

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt

QA Review: Jo Nell Mullins

Approved:

Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt

Issued:

Signature/Date

1.0 Objective

The purpose of this standard operating procedure (SOP) is to provide standard guidelines and methods for photographic documentation, which include still and digital photography and videotape or DVD recordings of field activities and site features (geologic formations, core sections, lithologic samples, water samples, general site layout, etc.). This document shall provide guidelines designed for use by a professional or amateur photographer. This SOP is intended for circumstances when formal photographic documentation is required. Based on project requirements, it may not be applicable for all photographic activities.

2.0 Background

2.1 Definitions

Photographer - A photographer is the camera operator (professional or amateur) of still photography, including digital photography, or videotape or digital versatile discs (DVD) recording whose primary function with regard to this SOP is to produce documentary or data-oriented visual media.

Identifier Component - Identifier components are visual components used within a photograph such as visual slates, reference markers, and pointers.

Standard Reference Marker - A standard reference marker is a reference marker that is used to indicate a feature size in the photograph and is a standard length of measure, such as a ruler, meter stick, etc. In limited instances, if a ruled marker is not available or its use is not feasible, it can be a common object of known size placed within the visual field and used for scale.

Slates - Slates are blank white index cards or paper used to present information pertaining to the subject/procedure being photographed. Letters and numbers on the slate will be bold and written with black indelible marking pens.

Arrows and Pointers - Arrows and pointers are markers/pointers used to indicate and/or draw attention to a special feature within the photograph.

Contrasting Backgrounds - Contrasting backgrounds are backdrops used to lay soil samples, cores, or other objects on for clearer viewing and to delineate features.

Data Recording Camera Back - A data recording camera back is a camera attachment or built-in feature that will record, at the very least, frame numbers and dates directly on the film.

2.2 Associated Procedures

- CDM Federal SOP 4-1, *Field Logbook Content and Control*

2.3 Discussion

Photographs and videotape or DVD recordings made during field investigations are used as an aid in documenting and describing site features, sample collection activities, equipment used, and possible lithologic interpretation. This SOP is designed to illustrate the format and desired placement of identifier components, such as visual slates, standard

reference markers, and pointers. These items shall become an integral part of the "visual media" that, for the purpose of this document, shall encompass still photographs, digital photographs, videotape recordings (or video footage), and recordings on DVDs. The use of a photographic logbook and standardized entry procedures are also outlined. These procedures and guidelines will minimize potential ambiguities that may arise when viewing the visual media and ensure the representative nature of the photographic documentation.

3.0 General Responsibilities

Field Team Leader - The field team leader (FTL) is responsible for ensuring that the format and content of photographic documentation are in accordance with this procedure. The FTL is responsible for directing the photographer to specific situations, site features, or operations that the photographer will be responsible for documenting.

Photographer - The photographer shall seek direction from the FTL and regularly discuss the visual documentation requirements and schedule. The photographer is responsible for maintaining a logbook per Sections 5.1, 5.2.4, and 5.3.1 of this SOP. Responsibilities will be defined in the project sampling plan.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site/quality assurance project plan (QAPP).

4.0 Required Equipment

A general list of equipment that may be used:

- 35mm camera or disposable single use camera (35mm or panoramic use)
- Digital camera
- Extra batteries for 35mm camera
- Video camera and appropriate storage media (e.g., video tapes, DVDs)
- Logbook
- Indelible black or blue ink pen
- Standard reference markers
- Slates
- Arrows or pointers
- Contrasting backgrounds
- Medium speed, or multi purpose fine-grain, color, 35mm negative film or slide film (project dependent)
- Data recording camera back (if available)
- Storage medium for digital camera

5.0 Procedures

5.1 Documentation

A commercially available, bound logbook will be used to log and document photographic activities. Review CDM Federal SOP 4-1, *Field Logbook Content and Control* and prepare all supplies needed for logbook entries.

Note: A separate photographic logbook is not required. A portion of the field logbook may be designated as the photographic log and documentation section.

Field Health and Safety Considerations

There are no hazards that an individual will be exposed to specific to photographic documentation. However, site-specific hazards may arise depending on location or operation. Personal protective equipment used in this operation will be site-specific and dictated through requirements set by the site safety officer, site health and safety plan, and/or prescribed by the CDM Federal Corporate Health and Safety Program. The photographer should contact the site safety officer for health and safety orientation before commencing field activities. The site health and safety plan must be read before entry to the site, and all individuals must sign the appropriate acknowledgement that this has been done.

The photographer should be aware of any potential physical hazards while photographing the subject (e.g., traffic, low overhead hazard, edge of excavation).

5.2 Operation

5.2.1 General Photographic Activities in the Field

The following sections provide general guidelines that should be followed to visually document field activities and site features using still/digital cameras and video equipment. Listed below are general suggestions that the photographer should consider when performing activities under this SOP:

- The photographer should be prepared to make a variety of shots, from close-up to wide-angle. Many shots will be repetitive in nature or format, especially close-up site feature photographs. Consideration should therefore be given to designing a system or technique that will provide a reliable repetition of performance.
- All still film photographs should be made using a medium speed, or multi purpose fine-grain, color negative film in the 35mm format unless otherwise directed by the FTL.
- It is suggested that Kodak brand "Ektapress Gold Deluxe" film or equivalent be used as the standard film for the still photography requirements of the field activities. This film is stable at room temperature after exposure and will better survive the time lag between exposure and processing. It is suggested that film speed ASA 100 should be used for outdoor photographs in bright sunlight, ASA 200 film should be used in cloudy conditions, and ASA 400 film should be used indoors or for very low-light outdoor photographs.
- No preference of videotape or DVD brand along with digital storage medium is specified and is left to the discretion of the photographer.
- The lighting for sample and feature photography should be oriented toward a flat condition with little or no shadow. If the ambient lighting conditions are inadequate, the photographer should be prepared to augment the light (perhaps with reflectors or electronic flash) to maintain the desired visual effect.
- Digital cameras have multiple photographic quality settings. A camera that obtains a higher resolution (quality) has a higher number of pixels and will store a fewer number of photographs per digital storage medium.

5.2.2 General Guidelines for Still Photography

Slate Information

It is recommended that each new roll of film or digital storage medium shall contain on the first usable frame (for film) a slate with consecutively assigned control numbers (a consecutive, unique number that is assigned by the photographer as in sample numbers).

Caption Information

All still photographs will have a full caption permanently attached to the back or permanently attached to a photo log sheet. The caption should contain the following information (digital photographs should have a caption added after the photographs are downloaded):

- Film roll control number (if required) and photograph sequence number
- Date and time
- Photographer
- Description of activity/item shown (e.g., name of facility/site, specific project name, project number)
- Direction (if applicable)

When directed by the sampling plan, a standard reference marker should be used in all documentary visual media. While the standard reference marker will be predominantly used in close-up feature documentation, inclusion in all scenes should be considered.

Digital media should be downloaded at least once each day to a personal computer; the files should be in either "JPEG" or "TIFF" format. Files should be renamed at the time of download to correspond to the logbook. It is recommended the electronic files be copied to a compact disc for backup.

Close-Up and Feature Photography

When directed by the sampling plan, close-up photographs should include a standard reference marker of appropriate size as an indication of the feature size and contain a slate marked with the site name and any identifying label, such as a well number or core depth, that clearly communicates to the viewer the specific feature being photographed.

Feature samples, core pieces, and other lithologic media should be photographed as soon as possible after they have been removed from their in situ locations. This enables a more accurate record of their initial condition and color. When directed by the sampling plan, include a standard reference color strip (color chart such as Munsell Soil Color Chart or that available from Eastman Kodak Co.) within the scene. This is to be included for the benefit of the viewer of the photographic document and serves as a reference aid to the viewer for formal lithologic observations and interpretations.

Site Photography
Site photography, in general, will consist predominantly of medium- and wide-angle shots. A standard reference marker should be placed adjacent to the feature or, when this is not possible, within the same focal plane.

While it is encouraged that a standard reference marker and caption/slate be included in the scene, it is understood that situations will arise that preclude their inclusion within the scene. This will be especially true of wide-angle shots. In such a case, the film/tape control number shall be entered in the photographic logbook along with the frame number and all other information pertinent to the scene.

Panoramic
In situations where a wide-angle lens does not provide sufficient subject detail, a single-use disposable panoramic camera is recommended. If this type of camera is not available, a panoramic series of two or three photos would be appropriate. Panoramas can provide greater detail while covering a wide subject, such as an overall shot of a site.

To shoot a panoramic series using a standard 35mm or digital camera, the following procedures are recommended:

- Use a stable surface or tripod to support the camera
- Allow a 20- to 30-percent overlap while maintaining a uniform horizon
- Complete two to three photos per series

5.2.3 General Photographic Documentation Using Video Cameras
As a reminder, it is not within the scope of this document to set appropriate guidelines for presentation or “show” videotape or DVD recording. The following guidelines are set for documentary videotape or DVD recordings only and should be implemented at the discretion of the site personnel.

Documentary videotape or DVD recordings of field activities may include an audio slate for all scenes. At the beginning of each video session, an announcer will recite the following information: date, time (in military units), photographer, site ID number, and site location. This oral account may include any additional information clarifying the subject matter being recorded.

A standard reference marker may be used when taking close-up shots of site features with a video camera. The scene may also include a caption/slate. It should be placed adjacent and parallel to the feature being photographed.

It is recommended that a standard reference marker and caption/slate be included in all scenes. The caption information is vital to the value of the documentary visual media and should be included. If it is not included within the scene, it should be placed before the scene.

Original video recordings will not be edited. This will maintain the integrity of the information contained on the videotape or DVD. If editing is desired, a working copy of the original video recording can be made.

A label should be placed on the videotape or DVD with the appropriate identifying information (project name, project number, date, location, etc.).

5.2.4 Photographic Documentation
Photographic activities must be documented in a photographic logbook or in a section of the field logbook. The photographer will be responsible for making proper entries.

In addition to following the technical standards for logbook entry as referenced in CDM Federal SOP 4-1, the following information should be maintained in the appropriate logbook:

- Photographer name.
- If required, an entry shall be made for each new roll/tape/DVD control number assigned.
- Sequential tracking number for each photograph taken (for digital cameras, the camera-generated number may be used).
- Date and time (military time).
- Location.
- A description of the activity/item photographed.
- If needed, a description of the general setup, including approximate distance between the camera and the subject, may be recorded in the logbook.
- Record as much other information as possible to assist in the identification of the photographic document.

5.3 Post Operation

All film will be sent for development and printing to a photographic laboratory (to be determined by the photographer). The photographer will be responsible for arranging transport of the film from the field to the photographic laboratory. The photographer shall also be responsible for arranging delivery of the negatives and photographs, digital storage medium, or videotape or DVD to the project management representative to be placed in the project files.

5.3.1 Documentation

At the end of each day's photographic session, the photographer(s) will ensure that the appropriate logbook has been completely filled out and maintained as outlined in CDM Federal SOP 4-1.

5.3.2 Archive Procedures

- Photographs and the associated set of uncut negatives, digital media, and original unedited documentary video recordings will be submitted to the project files and handled according to contract records requirements. The project manager will ensure their proper distribution.
- Completed pages of the appropriate logbook will be copied weekly and submitted to the project files.

6.0 Restrictions/Limitations

This document is designed to provide a set of guidelines for the field amateur or professional photographer to ensure that an effective and standardized program of visual documentation is maintained.

It is not within the scope of this document to provide instruction in photographic procedures, nor is it within the scope of this document to set guidelines for presentation or "show" photography.

The procedures outlined herein are general by nature. The photographer is responsible for specific operational activity or procedure. Questions concerning specific procedures or requirements should be directed to the project manager or FTL.

Note: Some sites do not permit photographic documentation. Check with the site contact for any restrictions.

7.0 References

U. S. Army Corps of Engineers. 2001. *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3. Appendix F. February.

U. S. Environmental Protection Agency. 1992. National Enforcement Investigations Center. *Multi-Media Investigation Manual*, EPA-330/9-89-003-R. p. 85. Revised March.

_____. Region IV. 2001. *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*. Athens, Georgia. November.

Project-Specific Modification

SOP No.: 4-5

SOP Title: Field Equipment Decontamination at Nonradioactive Sites

Project: Libby Asbestos Remedial Investigation (RI)

Project No.: 3282-137

Client: U.S. Environmental Protection Agency

Project Manager: _____ Date: 5/7/03

Technical Reviewer: _____ Date: 5/7/03

QA Reviewer: _____ Date: 5/12/03

EPA Approval: _____ Date: 5/19/03

Reason for and duration of modification: Site-specific procedures for decontamination of Libby amphibole asbestos contaminated field equipment are different than CDM Technical SOP 4-5. These modifications are necessary for the entire duration of the project.

All equipment used to collect, handle, or measure soil samples will be decontaminated in accordance with CDM Technical SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites, with the following modifications:

Section 4.0, Required Equipment - Plastic sheeting will not be used during decontamination procedures. American Society for Testing and Materials (ASTM) Type II water will not be used. Rather, locally available deionized (DI) water will be used.

Section 5.0, Procedures - Decontamination water will not be captured and will be discharged to the ground at the property.

Section 5.6, Waste Disposal - Decontamination water will not be captured and will not be packaged, labeled, or stored as investigation-derived waste (IDW).

Field Equipment Decontamination at Nonradioactive Sites

SOP 4-5
Revision: 7
Date: March 2007

Prepared: Steven Fundingsland

Technical Review: Mike Higman

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt

QA Review: Jo Nell Mullins

Approved:

Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt

Issued:

Signature/Date

1.0 Objective

The objective of this standard operating procedure (SOP) is to describe the general procedures required for decontamination of field equipment at nonradioactive sites. This SOP serves as a general guide and is applicable at most sites; however, it shall be noted that site-specific conditions (i.e., type of contamination, type of media sampled), the governing agency (e.g., EPA, DOE, USACE), and site-specific work plans, sampling and analysis plans and/or quality assurance (QA) project plans may require modifications to the decontamination procedures provided in this SOP. Decontamination of field equipment is necessary to ensure acceptable quality of samples by preventing cross contamination. Further, decontamination reduces health hazards and prevents the spread of contaminants offsite.

2.0 Background

2.1 Definitions

Acid Rinse - A solution of 10 percent nitric or hydrochloric acid made from reagent grade acid and analyte-free water.

Analyte-Free Water - Tap water that has been treated so that the water contains no detectable heavy metals or other inorganic compounds. Analyte-free water shall be stored only in clean glass, stainless steel, or plastic containers that can be closed when not in use.

Clean - Free of contamination and when decontamination has been completed in accordance with this SOP.

Cross Contamination - The transfer of contaminants through equipment or personnel from the contamination source to less contaminated or noncontaminated samples or areas.

Decontamination - The process of rinsing or otherwise cleaning the surfaces of equipment to rid them of contaminants and to minimize the potential for cross contamination of samples or exposure of personnel.

Material Safety Data Sheets (MSDS) - These documents discuss the proper storage and physical and toxicological characteristics of a particular substance used during decontamination. These documents, generally included in site health and safety plans, shall be kept on site at all times during field operations.

Organic-Free/Analyte-Free Water - Tap water that has been treated so that the water meets the analyte-free water criteria and contains no detectable organic compounds. Organic-free/analyte-free water shall be stored only in clean glass, Teflon™, or stainless steel containers that can be closed when not in use.

Potable Water - Tap water may be obtained from any municipal system. Chemical analysis of the water source may be required before it is used.

Sampling Equipment - Equipment that comes into direct contact with the sample media. Such equipment includes split spoon samplers, well casing and screens, and spatulas or bowls used to homogenize samples.

Soap - Low-sudsing, nonphosphate detergent such as Liquinox™.

Solvent Rinse - Pesticide grade, or better, isopropanol, acetone, or methanol.

2.2 Associated Procedures

- CDM Federal SOP 1-1 - *Surface Water Sampling*
- CDM Federal SOP 1-3 - *Surface Soil Sampling*
- CDM Federal SOP 1-4 - *Subsurface Soil Sampling*
- CDM Federal SOP 1-5 - *Groundwater Sampling Using Bailers*
- CDM Federal SOP 1-7 - *Wipe Sampling*
- CDM Federal SOP 1-9 - *Tap Water Sampling*
- CDM Federal SOP 1-11 - *Sediment/Sludge Sampling*
- CDM Federal SOP 2-2 - *Guide to Handling Investigation-Derived Waste*
- CDM Federal SOP 3-1 - *Geoprobe® Sampling*

3.0 Responsibilities

The project manager or designee, generally the field team leader (FTL), ensures that field personnel are trained in the performance of this procedure and that decontamination is conducted in accordance with this SOP and site-specific work plans. The FTL may also be required to collect and document rinsate samples (also known as equipment blanks) to provide quantitative verification that these procedures have been correctly implemented.

Note: Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific QA plan.

4.0 Required Equipment

- Stiff-bristle scrub brushes
- Plastic buckets and troughs
- Soap
- Nalgene or Teflon sprayers or wash bottles or 2- to 5-gallon, manual-pump sprayer (pump sprayer material must be compatible with the solution used)
- Plastic sheeting, plastic bags, and/or aluminum foil to keep decontaminated equipment clean between uses
- Disposable wipes, rags, or paper towels
- Potable water*
- Analyte-free water
- Organic-free/analyte-free water
- Gloves, safety glasses, and other protective clothing as specified in the site-specific health and safety plan
- High-pressure pump with soap dispenser or steam-spray unit (for large equipment only)
- Appropriate decontamination solutions pesticide grade or better and traceable to a source (e.g., 10 percent and/or 1 percent nitric acid [HNO_3], acetone, methanol, isopropanol, hexane)
- Tools for equipment assembly and disassembly (as required)
- 55-gallon drums or tanks for temporary storage of decontamination water (as required)
- Pallets for drums or tanks holding decontamination water (as required)

* Potable water may be required to be tested for contaminants before use. Check field plan for requirements.

5.0 Procedures

All reusable equipment (nondedicated) used to collect, handle, or measure samples shall be decontaminated before coming into contact with any sampled media or personnel using the equipment. Decontamination of equipment shall occur either at a central decontamination station or at portable decontamination stations set up at the sampling location, drill site, or monitoring well location. The centrally located decontamination station shall include an appropriately sized bermed and lined area on which equipment decontamination shall occur and shall be equipped with a collection system and storage vessels. In certain circumstances, berming is not required when small quantities of water are being generated and for some short duration field activities (i.e., pre-remedial sampling). Equipment shall be transported to and from the decontamination station in a manner to prevent cross contamination of equipment and/or area. Precautions taken may include enclosing augers in plastic wrap while being transported on a flatbed truck.

The decontamination area shall be constructed so that contaminated water is either collected directly into appropriate containers (5-gallon buckets or steel wash tubs) or within the berms of the decontamination area that then drains into a collection system. Water from the collection system shall be transferred into 55-gallon drums or portable tanks for temporary storage. Typically, decontamination water shall be staged until sampling results or waste characterization results are obtained and evaluated and the proper disposition of the waste is determined (SOP 2-2, *Guide to Handling Investigation-Derived Waste*). The exact procedure for decontamination waste disposal shall be discussed in the work plan. Also, solvent and acid rinse fluids may need to be segregated from other investigation-derived wastes.

All items that shall come into contact with potentially contaminated media shall be decontaminated before use and between sampling and/or drilling locations. If decontaminated items are not immediately used, they shall be covered either with clean plastic or aluminum foil depending on the size of the item. All decontamination procedures for the equipment being used are as follows:

General Guidelines

- Potable, analyte-free, and organic-free/analyte-free water shall be free of all contaminants of concern. Following the field QA sampling procedure described in the work plan, analytical data from the water source may be required.
- Sampling equipment that has come into contact with oil and grease shall be cleaned with methanol or other approved alternative to remove the oily material. This may be followed by a hexane rinse and then another methanol rinse. Regulatory or client requirements regarding solvent use shall be stated in the work plan.
- All solvents and acids shall be pesticide grade or better and traceable to a source. The corresponding lot numbers shall be recorded in the appropriate logbook.

  Note: Solvents and acids are potentially hazardous materials and must be handled, stored, and transported accordingly. Solvents shall never be used in a closed building. See the site-specific health and safety plan and/or the chemical's MSDS for specific information regarding the safe use of the chemical.
- Decontaminated equipment shall be allowed to air dry before being used.
- Documentation of all cleaning and field QA sampling shall be recorded in the appropriate logbook.
- Gloves, boots, safety glasses, and any other personnel protective clothing and equipment shall be used as specified in the site-specific health and safety plan.

5.1 Heavy Equipment Decontamination

Heavy equipment includes drilling rigs, well development rigs, and backhoes. Follow these steps when decontaminating this equipment:

- Establish a bermed decontamination area that is large enough to fully contain the equipment to be cleaned. If available, an existing wash pad or appropriate paved and bermed area may be used; otherwise, use one or more layers of heavy plastic sheeting to cover the ground surface and berms. All decontamination pads shall be upwind of the area under investigation.
- With the rig in place, spray areas (rear of rig or backhoe) exposed to contaminated media using a hot water high-pressure sprayer. Be sure to spray down all surfaces, including the undercarriage.
- Use brushes, soap, and potable water to remove dirt whenever necessary.
- Remove equipment from the decontamination pad and allow it to air dry before returning it to the work site.
- Record the equipment type, date, time, and method of decontamination in the appropriate logbook.

- After decontamination activities are completed, collect all contaminated wastewater, plastic sheeting, and disposable gloves, boots, and clothing in separate containers or receptacles. All receptacles containing contaminated items must be properly labeled for disposal as detailed in the field plan. Liquids and solids must be drummed separately.

5.2 Downhole Equipment Decontamination

Downhole equipment includes hollow-stem augers, drill pipes, rods, stems, etc. Follow these steps when decontaminating this equipment:

- Set up a centralized decontamination area, if possible. This area shall be set up to collect contaminated rinse waters and to minimize the spread of airborne spray.
- Set up a “clean” area upwind of the decontamination area to receive cleaned equipment for air-drying. At a minimum, clean plastic sheeting must be used to cover the ground, tables, or other surfaces on which decontaminated equipment is to be placed. All decontamination pads shall be upwind of any areas under investigation.
- Place the object to be cleaned on aluminum foil or plastic-covered wooden sawhorses or other supports. The objects to be cleaned shall be at least 2 feet above the ground to avoid splashback when decontaminating.
- Using soap and potable water in the hot water high-pressure sprayer (or steam unit), spray the contaminated equipment. Aim downward to avoid spraying outside the decontamination area. Be sure to spray inside corners and gaps especially well. Use a brush, if necessary, to dislodge dirt.
- If using soapy water, rinse the equipment using clean, potable water. If using hot water, the rinse step is not necessary if the hot water does not contain a detergent. If the hot water contains a detergent, this final clean water rinse is required.
- Using a suitable sprayer, rinse the equipment thoroughly with analyte-free water.
- Remove the equipment from the decontamination area and place in a clean area upwind to air dry.
- Record equipment type, date, time, and method of decontamination in the appropriate logbook.
- After decontamination activities are completed, collect all contaminated wastewaters, plastic sheeting, and disposable gloves, boots, and clothing in separate containers or receptacles. All receptacles containing contaminated items must be properly labeled for disposal. Liquids and solids must be drummed separately.

5.3 Sampling Equipment Decontamination

Follow these steps when decontaminating sampling equipment:

- Set up a decontamination line on plastic sheeting. The decontamination line shall progress from "dirty" to "clean." A clean area shall be established upwind of the decontamination wash/rinse activities to dry the equipment. At a minimum, clean plastic sheeting must be used to cover the ground, table, or other surfaces that the decontaminated equipment is placed for drying.
- Disassemble any items that may trap contaminants internally. Do not reassemble the items until decontamination and air drying are complete.
- Wash the items with potable water and soap using a stiff brush as necessary to remove particulate matter and surface films. The items may be steam cleaned using soap and hot water as an alternative to brushing. ***Note*: Polyvinyl chloride or plastic items shall not be steam cleaned.** Items that have come into contact with concentrated and/or oily contaminants may need to be rinsed with a solvent such as hexane and allowed to air dry prior to this washing step.
- Thoroughly rinse the items with potable water.

- If sampling for metals, thoroughly rinse the items with an acid solution (e.g., 10 percent nitric acid) followed by a rinse using analyte-free water. If sampling for organic compounds, thoroughly rinse the items with solvent (e.g., isopropanol) followed by a rinse using analyte-free water. The specific chemicals used for the acid rinse and solvent rinse phases shall be specified in the work plan. The acid rinsate and solvent rinsate must each be containerized separately. Acids and solvents are potentially hazardous materials and care must be exercised when using these chemicals to prevent adverse health affects (e.g., skin burns, irritation to the eyes and respiratory system). Appropriate personal protective equipment must be worn when using these chemicals. These chemicals (including spent rinsate) must be managed and stored appropriately. Special measures such as proper labels, paperwork, notification, etc. may be required when transporting or shipping these chemicals.
- Rinse the items thoroughly using organic-free/analyte-free water.
- Allow the items to air dry completely.
- After drying, reassemble the parts as necessary and wrap the items in clean plastic wrap or in aluminum foil.
- Record equipment type, date, time, and method of decontamination in the appropriate logbook.
- After decontamination activities are completed, collect all contaminated waters, used solvents and acids, plastic sheeting, and disposable personal protective equipment. Place the contaminated items in properly labeled drums for disposal. Liquids and solids must be drummed separately. Refer to site-specific plans for labeling and waste management requirements.

5.4 Pump Decontamination

Follow the manufacturer's recommendation for specified pump decontamination procedures. At a minimum, follow these steps when decontaminating pumps:

- Set up the decontamination area and separate "clean" storage area using plastic sheeting to cover the ground, tables, and other surfaces. Set up four containers: the first container shall contain dilute (nonfoaming) soapy water, the second container shall contain potable water, the third container shall be empty to receive wastewater, and the fourth container shall contain analyte-free water.
- The pump shall be set up in the same configuration as for sampling. Submerge the pump intake (or the pump, if submersible) and all downhole-wetted parts (tubing, piping, foot valve) in the soapy water of the first container. Place the discharge outlet in the wastewater container above the level of the wastewater. Pump soapy water through the pump assembly until it discharges to the waste container. Scrub the outside of the pump and other wetted parts with a metal brush.
- Move the pump assembly to the potable water container while leaving discharge outlet in the waste container. All downhole-wetted parts must be immersed in the potable water rinse. Pump potable water through the pump assembly until it runs clear.
- Move the pump intake to the analyte-free water container. Pump the water through the pump assembly. Pump the volume of water through the pump specified in the field plan. Usually, three pump-and-line-assembly volumes shall be required.
- Decontaminate the discharge outlet by hand, following the steps outlined in Section 5.3.
- Remove the decontaminated pump assembly to the clean area and allow it to air dry upwind of the decontamination area. Intake and outlet orifices shall be covered with aluminum foil to prevent the entry of airborne contaminants and particles.
- Record the equipment type, serial number, date, time, and method of decontamination in the appropriate logbook.

5.5 Instrument Probe Decontamination

Instrument probes used for field measurements such as pH meters, conductivity meters, etc. shall be decontaminated between samples and after use with analyte-free, or better, water.

5.6 Waste Disposal

Refer to site-specific plans and SOP 2-2 for waste disposal requirements. The following are guidelines for disposing of wastes:

- All wash water, rinse water, and decontamination solutions that have come in contact with contaminated equipment are to be handled, packaged, labeled, marked, stored, and disposed of as investigation-derived waste.
- Small quantities of decontamination solutions may be allowed to evaporate to dryness.
- If large quantities of used decontamination solutions shall be generated, each type of waste shall be contained in separate containers.
- Unless otherwise required, plastic sheeting and disposable protective clothing may be treated as solid, nonhazardous waste.
- Waste liquids shall be sampled, analyzed for contaminants of concern in accordance with disposal regulations, and disposed of accordingly.

6.0 Restrictions/Limitations

Nitric acid and polar solvent rinses are necessary only when sampling for metals or organics, respectively. These steps shall not be used, unless required, because of the potential for acid burns and ignitability hazards.

If the field equipment is not thoroughly rinsed and allowed to completely air dry before use, volatile organic residue, which interferes with the analysis, may be detected in the samples. The occurrence of residual organic solvents is often dependent on the time of year sampling is conducted. In the summer, volatilization is rapid, and in the winter, volatilization is slow. Check with your EPA region, state, and client for approved decontamination solvents.

7.0 References

American Society for Testing and Materials. 2002. *Standard Practice for Decontamination of Field Equipment at Nonradioactive Waste Sites*, ASTM D5088-02. January 10.

Department of Energy. Hazardous Waste Remedial Actions Program. 1996. *Standard Operating Procedures for Site Characterization*, DOE/HWP-100/R1. September.

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U. S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.1.

_____. 1992. *Standard Operating Safety Guidelines*; Publication 9285.1-03. June.

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_____. Region 4. 2001. *Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual*. November.

Control of Measurement and Test Equipment

SOP 5-1
Revision: 8
Date: March 2007

Prepared: Dave Johnson

Technical Review: Steve Guthrie

E-Signed by Michael C. Malloy
VERIFY authenticity with ApproveIt

QA Review: Jo Nell Mullins

Approved:

Signature/Date

E-Signed by P. Michael Schwan
VERIFY authenticity with ApproveIt

Issued:

Signature/Date

1.0 Objective

The objective of this standard operating procedure (SOP) is to establish the baseline requirements, procedures, and responsibilities inherent to the control and use of all measurement and test equipment (M&TE). Contractual obligations may require more specific or stringent requirements that must also be implemented.

2.0 Background

2.1 Definitions

Traceability - The ability to trace the history, application, or location of an item and like items or activities by means of recorded identification.

2.2 Associated Procedures

- CDM Federal Technical SOP 4-1, *Field Logbook Content and Control*
- CDM Quality Procedures (QPs) 2.1 and 2.3
- Manufacturer's operating and maintenance and calibration procedures

2.3 Discussion

M&TE may be government furnished (GF), rented or leased from an outside vendor, or purchased. It is essential that measurements and tests resulting from the use of this equipment be of the highest accountability and integrity. To facilitate that, the equipment shall be used in full understanding and compliance with the instructions and specifications included in the manufacturer's operations and maintenance and calibration procedures and in accordance with any other related project-specific requirements.

3.0 Responsibilities

All staff with responsibility for the direct control and/or use of M&TE are responsible for being knowledgeable of and understanding and implementing the requirements contained herein as well as any other related project-specific requirements.

The project manager (PM) or designee (equipment coordinator, quality assurance coordinator, field team leader, etc.) is responsible for initiating and tracking the requirements contained herein.

***Note*:** Responsibilities may vary from site to site. Therefore, all field team member responsibilities shall be defined in the field plan or site-/project-specific quality assurance plan.

4.0 Requirements for M&TE

- Determine and implement M&TE related project-specific requirements
- The maintenance and calibration procedures must be followed when using M&TE
- Obtain the maintenance and calibration procedures if they are missing or incomplete
- Attach or include the maintenance and calibration procedures with the M&TE
- Prepare and record maintenance and calibration in an equipment log or a field log as appropriate (Figure 1)
- Maintain M&TE records
- Label M&TE requiring routine or scheduled calibration (when required)
- Perform maintenance and calibration using the appropriate procedure and calibration standards
- Identify and take action on nonconforming M&TE

5.0 Procedures

5.1 Determine if Other Related Project-Specific Requirements Apply

For all M&TE:
The PM or designee shall determine if M&TE related project-specific requirements apply. If M&TE related project-specific requirements apply, obtain a copy of them and review and implement as appropriate.

5.2 Obtain the Operating and Maintenance and Calibration Documents

For GF M&TE that is to be procured:
Requisitioner - Specify that the maintenance and calibration procedures be included.

For GF M&TE that is acquired as a result of a property transfer:
Receiver - Inspect the M&TE to determine whether maintenance and calibration procedures are included with the item. If missing or incomplete, order the appropriate documentation from the manufacturer.

For M&TE that is to be rented or leased from an outside vendor:
Requisitioner - Specify that the maintenance and calibration procedures, the latest calibration record, and the calibration standards certification be included. If this information is not delivered with the M&TE, ask the procurement division to request it from the vendor.

5.3 Prepare and Record Maintenance and Calibration Records

For all M&TE:
PM or Designee - Record all maintenance and calibration events in a field log unless other project-specific requirements apply.

For GF M&TE only (does not apply to rented or leased M&TE):
If an equipment log is a project specific requirement, perform the following:

Receiver - Notify the PM or designee for the overall property control of the equipment upon receipt of an item of M&TE.

PM or Designee and User:
- Prepare a sequentially page numbered equipment log for the item using the maintenance and calibration form (or equivalent) (Figure 1).
- Record all maintenance and calibration events in an equipment log.

5.4 Label M&TE Requiring Calibration

For GF M&TE only (does not apply to rented or leased M&TE):
If calibration labeling is a project specific requirement, perform the following:

PM or Designee:
- Read the maintenance and calibration procedures to determine the frequency of calibration required.
- If an M&TE item requires calibration before use, affix a label to the item stating “Calibrate Before Use.”
- If an M&TE item requires calibration at other scheduled intervals, e.g., monthly, annually, etc., affix a label listing the date of the last calibration, the date the item is next due for a calibration, the initials of the person who performed the calibration, and a space for the initials of the person who shall perform the next calibration.

5.5 Operating, Maintaining or Calibrating an M&TE Item

For all M&TE:
PM or Designee and User - Operate, maintain, and calibrate M&TE in accordance with the maintenance and calibration procedures. Record maintenance and calibration actions in the equipment log or field log.

5.6 Shipment

For GF M&TE:
Shipper - Inspect the item to ensure that the maintenance and calibration procedures are attached to the shipping case, or included, and that a copy of the most recent equipment log entry page (if required) is included with the shipment. If the maintenance and calibration procedures and/or the current equipment log page (if required) is missing or incomplete, do not ship the item. Immediately contact the PM or designee and request a replacement.

For M&TE that is rented or leased from an outside vendor:
Shipper - Inspect the item to ensure that the maintenance and calibration procedures and latest calibration and standards certification records are included prior to shipment. If any documentation is missing or incomplete, do not ship the item. Immediately contact the procurement division and request that they obtain the documentation from the vendor.

5.7 Records Maintenance

For GF M&TE:
PM or Designee - Create a file upon the initial receipt of an item of M&TE or calibration standard. Organize the files by contract origin and by M&TE item and calibration standard. Store all files in a cabinet, file drawer, or other appropriate storage media at the pertinent warehouse or office location.

Receiver - Forward the original packing slip to the procurement division and a photocopy to the PM or designee.

PM or Designee and User:
- Maintain all original documents in the equipment file except for the packing slip and field log.
- File the photocopy of the packing slip in the M&TE file.
- Record all maintenance and calibration in an equipment log or field log (as appropriate). File the completed equipment logs in the M&TE records. Forward completed field logs to the PM for inclusion in the project files.

For M&TE rented or leased from an outside vendor:
Receiver - Forward the packing slip to the procurement division.

User:
- Forward the completed field log to the PM for inclusion in the project files.
- Retain the most current maintenance and calibration record and calibration standards certifications with the M&TE item and forward previous versions to the PM for inclusion in the project files.

5.8 Traceability of Calibration Standards

For all items of M&TE:
PM or Designee and User:
- When ordering calibration standards, request nationally recognized standards as specified or required. Request commercially available standards when not otherwise specified or required. Or, request standards in accordance with other related project-specific requirements.
- Require certifications for standards that clearly state the traceability.
- Require Material Safety Data Sheets to be provided with standards.
- Note standards that are perishable and consume or dispose of them on or before the expiration date.

5.9 M&TE That Fails Calibration

For any M&TE item that cannot be calibrated or adjusted to perform accurately:
PM or Designee
- Immediately discontinue use and segregate the item from other equipment. Notify the appropriate PM and take appropriate action in accordance with the CDM QP 2.3 for nonconforming items.
- Review the current and previous maintenance and calibration records to determine if the validity of current or previous measurement and test results could have been affected and notify the appropriate PM(s) of the results of the review.

6.0 Restrictions/Limitations

On an item-by-item basis, exemptions from the requirements of this SOP may be granted by the Headquarters health and safety manager and/or Headquarters quality assurance director. All exemptions shall be documented by the grantor and included in the equipment records as appropriate.

7.0 References

CDM Federal Programs Corporation. 2007. *Quality Assurance Manual.* Rev. 11.

CDM Federal Programs Corporation. 2005. *Government Property Manual*. Rev. 3.

Figure 1

CDM
A subsidiary of Camp Dresser & McKee Inc.

Maintenance and Calibration

Date: Time: (a.m./p.m.)

Employee Name: Equipment Description:

Contract/Project: Equipment ID No.:

Activity: Equipment Serial No.:

Maintenance

Maintenance Performed:

Comments:

Signature: Date:

Calibration/Field Check

Calibration Standard: Concentration of Standard:

Lot No. of Calibration Standard: Expiration Date of Calibration Standard:

Pre-Calibration Reading: Post-Calibration Reading:

Additional Readings: Additional Readings:

Additional Readings: Additional Readings:

Pre-Field Check Reading: Post-Field Check Reading:

Adjustment(s):

Calibration: □ Passed □ Failed

Comments:

Signature: Date:

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 8

STANDARD OPERATING PROCEDURE (SOP) FOR THE SAMPLING OF ASBESTOS FIBERS IN AIR

Prepared by: for W. Brattin (Author) Date: 3/8/01

Reviewed by: (Project Director) Date: 3/8/01

(Quality Assurance Coordinator) Date: 3/8/01

Approved by: for Paul Peronard (Project Manager) Date: 3/9/01

REVISION LOG

Revision Date	Reason for Revision
02/28/01	--
03/07/01	Further define pump calibration procedures.

PROCEDURAL SECTION

1.0 Scope and Applicability

This Standard Operating Procedure (SOP) provides a standardized method for sampling air to measure the concentration of asbestos fibers. This SOP is applicable to any type of asbestos fiber (amphibole, chrysotile) that may exist in air (either indoor or outdoor), and is applicable to both personal and ambient air (referred as stationary air throughout this SOP) sampling techniques. Filters collected in this way are suitable for examination by a variety of microscopic techniques, including TEM, PCM, and SEM.

2.0 Summary of Method

This SOP is based on air sampling techniques described in EPA SOP 2015, ISO 10312, OSHA Technical Manual, NIOSH 7400 and NIOSH 7402.

Air is drawn through a fine-pore filter in order to trap any suspended particulate matter in the air, including suspended asbestos fibers and other mineralogic materials. The filters are then examined using an appropriate microscopic technique to observe, characterize and quantify the number of asbestos fibers on the filter. The concentration of fibers in air is then calculated by dividing the total number of fibers on the filter by the volume of air drawn through the filter.

3.0 Health and Safety Warnings

Asbestos fibers are hazardous to human health when inhaled. Exposure to excessive levels may increase the risk of lung cancer, mesothelioma, and asbestosis. All personnel engaged in collection of air samples in areas where asbestos fibers may be present must have adequate health and safety training and must wear an appropriate level of personal protective equipment (PPE). Refer to the Health and Safety Plan for further details.

4.0 Cautions

None, refer to Section 3.0.

5.0 Interferences

High levels of dust or other suspended particulates may clog or overload the filter and reduce the ability to observe and characterize asbestos fibers on the filters. Precautions should be taken to avoid any unnecessary sources of dust emissions or use of aerosol sprays. Sampling conditions

(flow rate, sampling time) should be adjusted accordingly to avoid filter overload.

6.0 Personnel Qualifications

Field personnel engaged in collection of filter cassettes must be trained in the proper use and calibration of the air sampling equipment (as specified in this SOP), as well as proper methods for data recording and sample handling. Additionally, all field personnel must maintain appropriate and current training and/or certifications to meet all federal, state, and local regulations.

7.0 Apparatus and Equipment

Filter Cassettes

All samples will be collected on conductive filter holders consisting of 25-mm diameter, three piece filter cassettes having a 50-mm long electrically conductive extension cowl. The cassette shall be pre-loaded with a mixed cellulose ester (MCE) filter with pore size 0.8 um. Use of the 0.8 um pore size is recommended for all samples so that samples collected using a high volume pump are comparable to samples collected with a low volume pump. The 0.8 um pore size filters are used for samples collected with a low volume pump in order to decrease back-pressure and increase flow rate.

To reduce contamination and to hold the cassette tightly together, seal the crease between the cassette base and the cowl with a shrink band or adhesive tape. If particle deposition on the inside of the cowl is observed, it may be necessary to ground the cowl to reduce static charge. This is done by attaching one end of a length of flexible wire to the plastic cowl with a hose clamp and attaching the other end of the wire to a suitable ground (e.g., a cold water pipe).

Air Pumps

The sampling pump used shall provide a non-fluctuating airflow through the filter and shall maintain the initial flow rate within ± 10% throughout the sampling period.

A variety of different types of air pump may be used, depending on the flow rates that are required to achieve the data quality objectives and desired analytical sensitivity of the project. In general, the pump should be selected to deliver a flow rate that is as high as possible without overloading the filter with dust or fibers. The minimum flow rate is 0.5 L/min, and rates up to 10 L/min may be appropriate in some cases.

For stationary air monitors, a high volume pump that operates on AC power is recommended. For personal air sampling, either a portable high volume AC powered sampler or a low volume

battery-operated pump are acceptable, depending on whether the activities of the individual are impaired by the tethering imposed by the power cord needed for the high volume pump.

Tripod

For stationary air monitors, a tripod or other similar device is required to hold the filter cassette at a specified elevation above the floor. As noted below, this will typically be a height that represents the breathing zone (1.5-2 meters).

Spring Clips

For personal air monitors, the filter cassette is held in place using spring clips or other similar devices.

Rotameter

A rotameter that has been calibrated to a primary calibration source is required to calibrate the air flow rate at the start and the end of each sampling period. Due to its dependency on changes in atmospheric pressure, the rotameter must be calibrated to a primary calibration source at the site location (e.g., City of Libby) prior to sampling and re-calibrated on-site every week. Record calibration and re-calibration to the primary standard in the field logbook.

Primary Calibration Source

A bubble buret or other primary calibration standard may be used to calibrate the rotameter.

Sample Labels

A pre-printed sheet of sample labels (2 identical labels per sample number) is required. One label should be attached to the filter cassette before the sample collection period begins, and the matching label should be attached to the field data sheet that records relevant data on the sample being collected.

Field Log Book

A field log book is required to record relevant information regarding the collection of samples (location, time, unusual conditions or problems, etc.).

Field Data Sheet

A personal air or stationary air monitoring field data sheet (as appropriate) is required to record the relevant sampling information. Refer to the Phase 2 QAPP (EPA, March 2001) for the form.

8.0 Instrument Calibration

External calibration devices such as a bubble buret or a rotometer that have been calibrated to a primary calibration source may be used to calibrate air flow rate prior to air sampling. The flow rate must also be measured by the same method at the end of the sampling period.

8.1 Calibrating a Rotameter with an Electronic Calibrator (DryCal)

- See manufacturer's manual for operational instructions.
- To set up the calibration train, attach one end of the tygon tubing to the outlet plug of the rotameter; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the inlet plug of the rotameter to the outlet plug on the DryCal.
- Rest or firmly stabilize the rotameter so that it is vertical (± 6°).
- Attach an isolating load with a pressure drop of about 10 to 20 inches of water column in series with a stable pump (a filter cassette of same lot number as will be used for field samples works well for this).
- Turn the DryCal and sampling pump on.
- Turn the flow adjust screw (or knob) on the pump until the desired flow rate is attained.
- Record the DryCal flow rate reading and the corresponding rotameter reading in the field logbook. The rotameter should be able to work within the desired flow range.
- Perform the calibration three times until the desired flow rate of ± 5% is attained. Once at the sampling location, a secondary calibrator (e.g., rotameter) may be used to calibrate sampling pumps.

8.2 Calibrating an Air Pump with a Rotameter

A rotameter can be used provided it has been precalibrated to a primary calibration source at the site location (e.g., City of Libby). Three separate constant flow calibration readings should be obtained both before sampling and after sampling. The mean value of these flow rate measurements shall be used to calculate the total air volume sampled.

Turn on the sampling pump and run for 5 minutes before performing calibration.

- Remove the end plugs on the filter cassette. A cassette, representative of the lot planned for use in air sampling, must be used.
- To set up the calibration train, attach one end of the tygon tubing to the cassette base; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the cassette cap to the rotameter.

- Rest or firmly stabilize the flow meter so that it is vertical (± 6°).
- Turn the flow adjust screw (or knob) on the sampling pump until the center of the float ball on the rotameter meets the flow rate value specified in the project plan.

9.0 Sample Collection

Apply one of the pre-printed adhesive labels to the filter cassette and apply the other to the field data sheet for the sample.

Secure the filter cassette in the appropriate sampling location. For a fixed air monitor, this will generally be at a height that represents the breathing zone of the potentially exposed population (e.g., 1.5- 2 meters above the floor). For personal air monitoring, the cassette will typically be placed on the lapel just below the face of the individual being monitored. For personal air sampling for Scenarios 2 and 3 [Refer to Phase 2 QAPP (EPA March 2001)] , secure the cassette on the lapel of the dominant hand of the worker. The distance from the nose/mouth of the person to the cassette should be about 10 cm. Secure the cassette on the collar or lapel using spring clips or other similar devices. In all cases, orient the cassette so the open face of the cowel is pointing downward to avoid any particles entering the filter by precipitation. Remove the protective cap over the open face of the cowel and turn on the calibrated pump. Record the starting time, the initial flow rate, and all other relevant sample data on the field data sheet for the sample. Store covers and end plugs in a clean area (e.g., a closed bag or box) during the sampling period.

For sampling events lasting longer than 2 hours, in-field pump checks should be performed approximately every 2 hours. These periodic checks should include the following activities:

- Observe the sampling apparatus (filter cassette, pump, tripod, etc.) to determine whether it's been disturbed.
- Check the pump to ensure it is working properly and the flow rate is stable at the prescribed flow rate.
- Inspect the filter for overloading and particle deposition. Inspect the filter using a small flashlight. Look for particle adhesion or deposition on the side of the cassette and check the filter surface for accumulation of visible dust or smoke particles. If particle deposition on the inside of the cowl is observed, it may be necessary to ground the cowl to reduce static charge.

After the specified sampling period has elapsed, measure the ending flow rate and ending clock time on the data sheet. Turn off the pump and remove the cassette from the pump. Attach and secure a sample seal around each sample cassette in such a way as to assure that the end cap and

base plug cannot be removed without destroying the seal. Tape the ends of the seal together since the seal is not long enough to be wrapped end-to-end. Initial and date the seal.

10. Sample Handling and Preservation

Package the cassettes so they will not rattle during shipment nor be exposed to static electricity. Place custody seals, dated and marked with the packager's signature, onto the shipping container. Do not ship samples in polystyrene peanuts, vermiculite, paper shreds, or excelsior. Tape sample cassettes to sheet bubbles and place in a container that will cushion the samples in such a manner that they will not rattle. For additional shipping requirements, see the project plan.

Ship the sealed cassette to the analytical laboratory under proper chain of custody procedures. No preservation of the cassette is required.

QUALITY CONTROL and QUALITY ASSURANCE

Pre-Project Filter ("Lot") Blanks

Before samples are collected, two cassettes from each filter lot of 100 cassettes should be randomly selected and submitted for analysis. The lot blanks will be analyzed for asbestos fibers by the same method as will be used for field samples. The entire batch of cassettes should be rejected if any asbestos fiber is detected on any filter.

Field Blanks

Blank samples are used to determine if any contamination has occurred during sample handling. Prepare two blanks (from the sample lot used for field sampling) for the first 1 to 20 samples. For sets containing greater than 20 samples, prepare blanks as 10% of the samples. Filter blanks should be taken to a sampling location and prepared there. Remove the caps on the filter cassette and hold the cassette open for about 30 seconds. Close and seal the cassette as described in Section 9. Store blanks for shipment with the sample cassettes.

REFERENCES

NIOSH 7400

NIOSH 7402

ISO 10312

OSHA Technical Manual

EPA SOP 2015

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 1135456

SITE NAME: LIBBY ASBESTOS

DOCUMENT DATE: 12/05/2008

DOCUMENT NOT SCANNED

Due to one of the following reasons:

☐ **PHOTOGRAPHS**

☐ **3-DIMENSIONAL**

☐ **OVERSIZED**

☑ **AUDIO/VISUAL**

☐ **PERMANENTLY BOUND DOCUMENTS**

☐ **POOR LEGIBILITY**

☐ **OTHER**

☐ **NOT AVAILABLE**

☐ **TYPES OF DOCUMENTS NOT TO BE SCANNED**
(Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

1 CD - APPENDIX B STANDARD OPERATING PROCEDURES (SOPs)

Contact the Superfund Records Center to view available document.
(303) 312-6473

APPENDIX C
FIELD SAMPLE DATA SHEET

Sheet No.: SA-**00«seq»**

LIBBY FIELD SAMPLE DATA SHEET (FSDS) FOR STATIONARY AIR

Field Logbook No: _____ Page No: _____ Sampling Date: _____

Address: _____ Owner/Tenant: _____

Business Name: _____

Land Use: Residential School Commercial Mining Roadway Other ( )

Sampling Team: CDM Other _____ Names: _____

Data Item	Cassette 1	Cassette 2	Cassette 3
Index ID			
Location ID			
Sample Group			
Location Description			
Category (circle)	FS FB-(field blank) LB-(lot blank) DB-(prep-dry blank)	FS FB-(field blank) LB-(lot blank) DB-(prep-dry blank)	FS FB-(field blank) LB-(lot blank) DB-(prep-dry blank)
Matrix Type (circle)	Indoor Outdoor NA	Indoor Outdoor NA	Indoor Outdoor NA
Filter Diameter (circle)	25mm 37mm	25mm 37mm	25mm 37mm
Pore Size (circle)	TEM- .45 PCM- 0.8	TEM- .45 PCM- 0.8	TEM- .45 PCM- 0.8
GPS Status (circle)	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected-not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected- not required for sample	Collected Previously Collected Not Collected-no signal (3 attempts) Not Collected- not required for sample
GPS File (fill in or circle)	Filename:_____ NA	Filename:_____ NA	Filename:_____ NA
Flow Meter Type (circle)	Rotometer DryCal NA	Rotometer DryCal NA	Rotometer DryCal NA
Pump ID Number			
Flow Meter ID No.			
Start Date			
Start Time			
Start Flow (L/min)			
Stop Date			
Stop Time			
Stop Flow (L/min)			
Pump fault? (circle)	No Yes NA	No Yes NA	No Yes NA
MET Station onsite? (circle)	No Yes NA	No Yes NA	No Yes NA
Sample Type (circle)	Pre Post Clear 2nd Clear 3rd Clear NA	Pre Post Clear 2nd Clear 3rd Clear NA	Pre Post Clear 2nd Clear 3rd Clear NA
Field Comments Cassette Lot Number:_____	Archive Blank (circle): Yes No	Archive Blank (circle): Yes No	Archive Blank (circle): Yes No
Entered (LFO): _____	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____	Volpe: Entered _____ Validated _____

For Field Team Completion (Provide Initials)	Completed by:	QC by:

vs 10507

APPENDIX D
SUMMARY OF PREPARATION AND ANALYTICAL REQUIREMENTS FOR ASBESTOS

Requirements Revision #: 0
Effective Date: 12/05/2008

SAP ANALYTICAL SUMMARY # OU4LS1208
SUMMARY OF PREPARATION AND ANALYTICAL REQUIREMENTS FOR ASBESTOS

SAP Title: Final Sampling and Analysis Plan for Libby Public Schools- Stationary Air Sample Collection, Libby Asbestos Superfund Site, Libby, Montana

SAP Date/Revision: 12-05-08/N/A

EPA Technical Advisor: Mary Goldade (303-312-5668, Goldade.Mary@epamail.epa.gov); Mark Raney (617-494-2377, Mark.Raney@dot.gov)
(contact to advise on DQOs of SAP related to preparation/analytical requirements)

Sampling Program Overview: Collection of stationary air samples at the five Libby public schools during regular school hours and under ambient conditions.

Index ID Prefix: SI-

Medium-Specific TEM Preparation and Analytical Requirements for Field Samples:

Medium Code	Sample Type	Preparation Details				Analysis Details			Applicable Laboratory Modifications
		Investigative? (a)	Indirect Prep? (a,b)		Filter Archive? (b)	Method	Recording Rules	Analytical Sensitivity/ Prioritized Stopping Rules	
			With Ashing (b)	Without Ashing (b)					
A	Stationary Air Samples	Yes	Yes – if ≥ 25% loaded with organic material	Yes - if overloaded or unevenly loaded material on filter	Yes	TEM – ISO 10312	All asbestos L ≥ 0.5um AR ≥ 3:1	Count until one is achieved (i) Target S = 0.0006 cc^{-1} (ii) 25 LA found, or (iii) An area of 0.5 mm^2 of filter evaluated **For Chrysotile only**: (iv) 50 C found	LB-000016a, LB-000019, LB-000028, LB-000029b, LB-000030, LB-000031a, LB-000053, LB-000066c, LB-000084, LB-000085

(a) See LB-000053 for additional details
(b) See most current version of EPA-LIBBY-08 for preparation details

TEM Preparation and Analytical Requirements for Quality Control Samples:

Medium Code	Sample Type	Preparation Details			Analysis Details			Applicable Laboratory Modifications
		Indirect Prep?		Archive?	Method	Recording Rules	Stopping Rules	
		With Ashing	Without Ashing					
B	Field Blank	No	No	Yes	TEM – ISO 10312	All asbestos $L \geq 0.5um$ $AR \geq 3:1$	Evaluate 0.1 mm^2 of filter area	LB-000016a, LB-000019, LB-000028, LB-000029b, LB-000030, LB-000031a, LB-000053, LB-000066c, LB-000084, LB-000085
C	Lot Blank	No	No	Yes	TEM – ISO 10312	All asbestos $L \geq 0.5um$ $AR \geq 3:1$	Evaluate 0.1 mm^2 of filter area	LB-000016a, LB-000019, LB-000028, LB-000029b, LB-000030, LB-000031a, LB-000053, LB-000066c, LB-000084, LB-000085

PLM Preparation and Analytical Requirements: N/A

Laboratory Quality Control Frequencies:

TEM: Lab Blank – 4%
Recount Same – 1%
Recount Different – 2.5%
Verified Analysis – 1%
Repreparation – 1%

PLM: Lab Duplicate – 10%

Requirements Revision:

Revision #:	Effective Date:	Revision Description
0	12-05-08	N/A

Analytical Laboratory Review Signoff:

- ☒ Batta [sign & date: B. Batta 12-05-08]
- ☒ EMSL-Libby [sign & date: R.K. Mahoney 4 December 2008]
- ☒ EMSL – Westmont [sign & date: Robyn L. Denton 4 December 2008]
- ☒ EMSL – Beltsville [sign & date: C. LaCerra for Joe Centibonti 12-4-08]
- ☒ USAT [sign & date: Douglas K. Kent 4 December 2008]
- ☒ Hygeia [sign & date: Kyeong Corbin 12-4-08]
- ☒ MAS [sign & date: Michael D. Mount 12-4-08]
- ☒ RJSI [sign & date: Jeanne Ott 12-4-08]

[illegible]

APPENDIX E
RECORD OF MODIFICATION FORM

Record of Modification

to the

Libby Sampling and Quality Assurance Project Plan

Field Activities

LFO-0000__

Instructions to Requester: **Fax to contacts at bottom of form for review and approval.**
File approved copy with Data Manager at the Libby Field Office (LFO).
Data Manager will maintain legible copies in a binder that can be accessed by LFO personnel.

Project QAPP (circle one): Phase I (approved 4/00) Phase II (approved 2/01)
Removal Action (approved 7/00) Contaminant Screening Study (approved 5/02)
Other (Title and approval date):_____

SOP (Number and Revision No.):_____
_____
_____

Other Document (Title, Number/Revision): _____

Requester: _____ Title: _____
Company: _____ Date: _____

Description of Modification (attach additional sheets if necessary; state section and page numbers of SQAPP when applicable):_____
_____
_____
_____

Field logbook and page number Modification is documented on: _____

Implications of Modification: _____
_____
_____
_____

Duration of Modification (circle one):
Temporary Date(s):_____
Resident address(es): _____
_____

- If appropriate, attach a list of all applicable Index Identification numbers.

Permanent (complete Proposed Modification Section) Effective Date:_____

Potential Implications of Modification:_____
_____
_____
_____

Technical Review and Approval: _____ Date:_____
(Volpe Project Manager or designate)

EPA Review and Approval: _____ Date:_____
(USEPA RPM or designate)